School Shop

vol. XVIII no. 3
November 1958

Industrial Education in the USSR
by Lane C. Ash

Sketching as an Aid to Multiview Drawing
by George K. Stegman

Mosaic Tilework in Industrial Arts
by C. Vernon Siegner

Power Supply for the Radio Shop
by A. B. Crawford

Cover story: Both boys and girls take woodworking in the Russian polytechnical program. For a first-hand account of the modern Russian program, see page seven.

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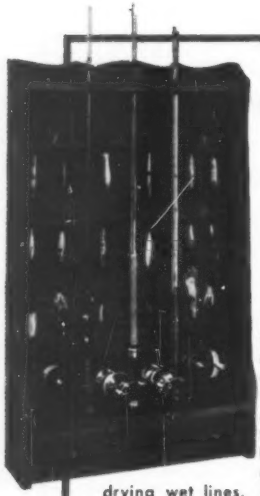

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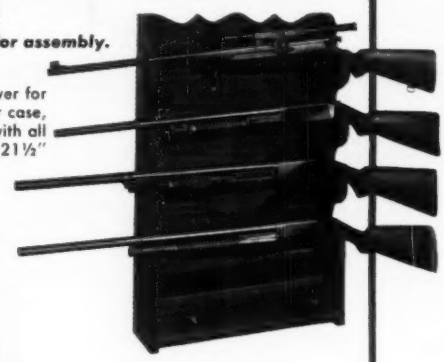

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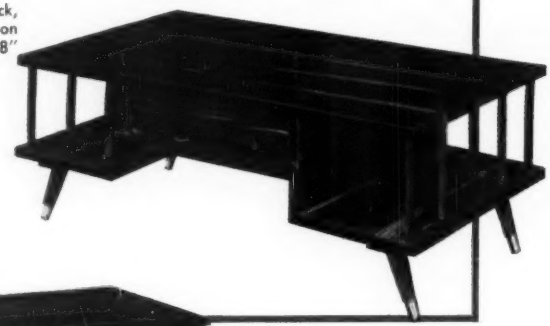

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CONTENTS

Industrial Education in the USSR.....Lane C. Ash 7
A first-hand account of a personal visit to Russia by the author as a member of the official U. S. delegation invited by the Russian Government to observe their schools.

Measuring Test.....Ira C. Madden 9
Here is a description of a useful technique for testing students on the use of standard measuring practices.

Sketching as an Aid to Multiview Drawing..George K. Stegman 10
How and why sketching is useful in teaching multiview drawing.

Tool Dispensing.....H. J. Gerber 12
Practical suggestions for simplifying the problem of distributing tools to students.

Car Rack for Dad.....E. R. Roberts 13
A useful project that fits almost every style of cartop.

Mosaic Tilework in Industrial Arts.....C. Vernon Siegner 14
How to go about introducing mosaic tilework in your classes.

Extension Box.....Kenneth Folster 15
A useful project for teaching basic principles of electricity.

Power Supply for the Radio Shop.....A. B. Crawford 16
This device offers flexibility of power sources and helps to prevent shorts.

It's All Storage.....Dwayne Gilbert 24
A portable tool-storage panel that helps solve crowding problems.

What to Stress in Electronics?.....Chester H. Gausman 26
A report of what areas industry and teachers think should be covered in a trade course.

Plastic Night Lamp.....Bob Reeves 32
An attractive project involving both plastics and electricity.

Restating the Concept of Projects.....H. J. Kauffman 34
Projects should mean more than "busy work."

Modern End Table.....John W. Dawley 36
Woodworking students can be proud to take this project home.

REGULAR FEATURES

School Shop Talk..... 2
Education—Russian and American.

Diamond Dust....Thomas Diamond 18
Ladies, Please Note.

Here Is a Way..... 20
Hints on publicizing your program.

News..... 22
Happenings in industrial education.

In the Morning Mail..... 33
Comments from readers.

School Shop Kinks..... 38
Short cuts for doing shopwork.

Instructional Resources..... 40
The latest in books, pamphlets, and audio-visuals.

Project Design...Robert A. Tinkham 44
What the industrial designers are doing.

News from Industry..... 46
New products and teaching aids. Send in a card today.

From Washington.....Michael Paca 56
News from the Nation's Capital.

Index to Advertisers..... 56
Send in a card today.

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School Shop TALK

COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

Education—Russian and American

Russian industrial education has received considerable attention in SCHOOL SHOP recently and this month is no exception. Lane C. Ash of the Vocational Division, U.S. Office of Education, had an unusual opportunity to visit Russian schools for a month this spring and his perceptive report will be found a few pages from here in this issue.

Russia is moving ahead rapidly on the technological front and many Americans feel that we are being left at the post. There may be some truth in this attitude, but calm judgment dictates that we find out at what cost this Russian momentum is being maintained and whether we have values in our education that would be lost, should we emulate the Russians.

A reading of Mr. Lane's article and of the one on Russian vocational education in our May issue will serve to bring out some of the differences. First, and most obvious, is the lack of personal choice by the student, or his parents, of the curriculum the student will pursue. Training is given in the areas where the state needs workers and the student takes what he or she is told to take. Needless to say, Americans would not be enthusiastic about this type of programming.

Russian students work harder and spend more hours in school than do ours. The school week is six days long and the year extends from early September to late June without the long holidays we enjoy. Pressures for student performance are heavy. Little attention is paid to individual differences so everyone is expected to do a full schedule of work of acceptable quality. This pressure is so great that some public reaction has built up to the amount of it and school officials are becoming concerned.

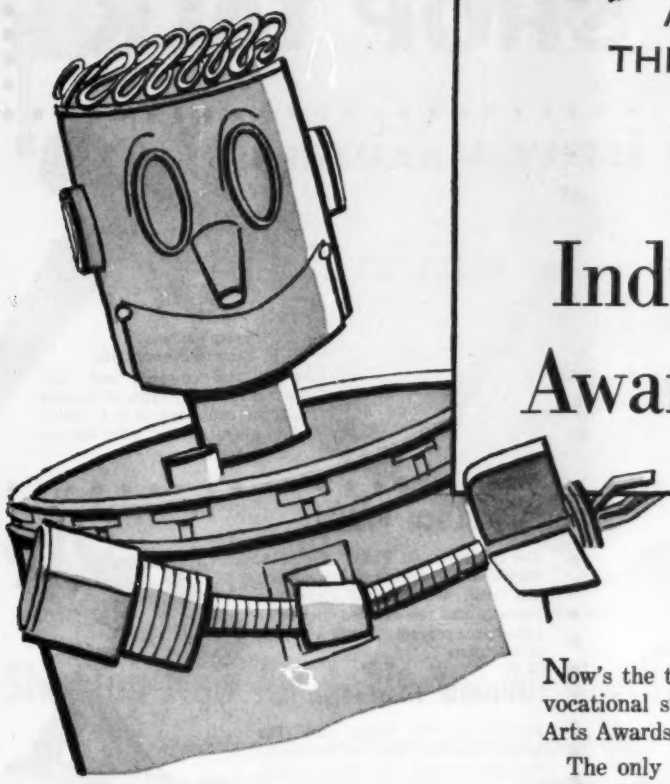
An interesting contrast is in the objectives and content of the work in what we call industrial education and the Russians call polytechnical training. For instance, we pay considerable attention to manipulative skills and some attention to consumer information. The Russians are less concerned with manipulation and more with studying the application of scientific principles in a shop situation with tools, machines, and materials.

The Russians have a work program for their students in industry and are attempting to enlarge it. Portions of it are much like the American cooperative program but the Russians make it compulsory for practically all students while in this country it is confined to the relatively small percentage of students enrolled in a co-op program, mostly in business education but, to a lesser extent, in the T&I area.

Pressure is on our public schools to do something in the areas of science and mathematics. Many articles have appeared in the public prints about the shortcomings of schools in these fields although some of the authors have been a little less than "scientific" in the accuracy of their statements. The fruition of this attitude of "let's do something about science and math" is found in the National Defense Education Act in which Congress is trying to prod the schools into greater activity through monetary grants. The success of the Russian Sputnik is no doubt responsible for the unprecedented largesse from the federal government.

The danger in going off half-cocked on a "let's-emulate-Russia" program is in changing the goals of American education. Russia has one set of goals which are apparent from the articles that have been appearing in these pages. We have another set of goals which have evolved through nearly two centuries of public education in America. To let one astonishing scientific triumph by the Russians change our whole outlook on education could be little less than disastrous.

In the industrial-education field, Mr. Lane's article indicates that, if anything, Russia has taken a page from the book of American education. Its new program of polytechnical education has elements of both industrial arts and trade and industrial education in it. The work program in Russia is much like the cooperative program in this country. In the U.S. a few hardy souls have been calling for more teaching in the shop subjects for the scientific principles found applied therein and some have been doing just that for years. When recasting American education, let's remember some of these things.—L.W.P.



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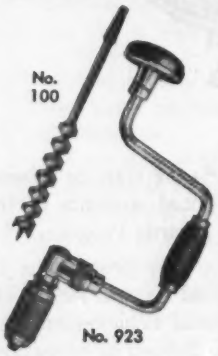

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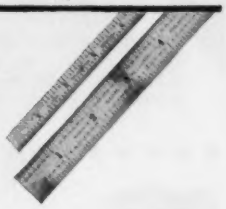

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Misha Krupin, a fifth-grader in a Moscow school metalworking class, uses the vise to help him hold the tin snips while he cuts a piece of metal.

A bench lathe with a turret toolpost is used by these sixth graders in a Moscow school to turn a shoulder on a piece of steel. Note uniform ties.

A first-hand account of

Industrial Education in the USSR

By Lane C. Ash

Assistant Director, Division of Vocational Education, U.S. Office of Education, Washington, D.C.

"LIFE is not a game but productive labor—children must know practical life very well," the Minister of Education told us in Moscow. Minister Afanasenko of the Russian Soviet Federated Socialist Republic made this statement to emphasize the importance of the new polytechnical curriculum for the ten-year general school. He stressed the point that it is desirable to give experience with practical work at an early age because "for a student to understand his social life, his experience must include productive work, and this should be experienced by every student."

We were members of a delegation of ten U.S. educators who had been invited by the Ministry of Education of the Soviet government to visit that country to study the school system during a 30-day period in May and June of this year. Our visit was made in accordance with the terms of the Cultural Exchange Agreement signed by our two governments on January 27, 1958. It is anticipated that a similar delegation of Russian educators will visit this country in the near future. In connection with this exchange of persons, it is hoped that an exchange of materials will provide the Office of Education with a collection of textbooks and other instructional materials used in Russian schools. These will be supplied on a continuing basis, periodically. This is planned as the beginning of a permanent exhibit of instructional materials available for comparative-education purposes.

The Minister's statement about the value of work as preparation for life was not just an expression of hope or of a desirable outcome to be achieved. Work experience, and the development of wholesome attitudes toward work, undergirds the entire educational system of the Soviet Union. Soviet education aims to develop versatile, active, and conscious builders of a communist society.

We saw evidence of this everywhere we went during our short stay in that country. In the kindergarten, children from age three to seven were performing assigned tasks having to do with the upkeep of their quarters. In the elementary schools, pupils also have work duties and in addition they begin formal instruction in arts and crafts. In the secondary

The first day in metalworking shop means filing to these seventh-graders in a Russian school. This is considered fundamental instruction here.

school, the student assumes responsibilities for orderly procedures in the building and formal instruction in school shops. Some also engage in productive activities in factories and on farms, both during the school year and at the end of the spring semester. Interestingly, one penalty for violation of the rules or misbehavior in school is to deny the offender his privilege of performing assigned extra class duties. In vocational schools, in the *technicums* and in the institutes (engineering schools), we observed school and factory industrial activities of the students.

From Moscow to Siberia

We arrived in Moscow on May 8th. The delegation was greeted with great friendliness by everyone. Even though a schedule of activities covering the entire time of our projected stay in that country had been prepared by our hosts, we were permitted latitude in selecting the types of schools and institutions we wished to observe as well as, for the most part, the cities which we wanted to visit. After a week in the capital city for orientation purposes, we were conducted on a tour of nearly 7,000 miles, stopping at seven other cities. These were in Siberia, Central Asia, and on the Black Sea, as well as in the European part of the country.

The general school of the USSR is of two kinds. One, seven years in length and called the incomplete secondary school, is confined largely to the rural areas. The complete secondary school, ten years in length, is found in all of the major cities. There is only one curriculum for each kind of school, although this is available to the students under three plans in the complete secondary school. There is almost no opportunity to elect subjects other than those prescribed for all school children. Classes are held six days a week and school is in session from early September to late June.

In his report to the Twentieth Congress of the Communist party in February, 1956, Mr. Khrushchev said, "A big shortcoming of our school system is that the instruction is divorced from life to some extent; those who finish school are insufficiently prepared for practical work." Speaking about the introduction of polytechnical subjects in the school curriculum, he continued, "To strengthen their ties with life, the schools must not only introduce new subjects which teach pupils the fundamentals of technology and production, but also systematically accustom them to working in factories, collective and state farms, experimental plots, and school work shops. The secondary-school curriculum should be revised to include greater production specialization. . . ."

Practical Work Emphasized

The school curriculum is now undergoing change. A new emphasis on the practical application of scientific principles learned in the classroom reflects the importance attached to the preparation of students for work and the need for scientific and technical manpower in the USSR.

For some time, the general school curriculum under Plan I has provided for a small amount of practical work experience and opportunity for observation of industry practice on student excursions. Beginning with the 1957 school year there was added to this program "educationally productive practice." This means work during the last weeks of the school year on farms and in industrial plants for two to four weeks, depending on local conditions, at the rate of four hours per day.

A new curriculum, known as Plan II, adds greatly to the number of hours of school-shop work as well as agriculture and industry practice in approximately half of the secondary schools of the country. This is the introductory polytechnical curriculum. Whereas students in grades eight, nine, and ten under Plan I spend less than 200 hours in school-shop work in these grades, under Plan II the number of hours of shop work has been increased to 374. The new emphasis in shop experiences is in applied science rather than in acquisition of manipulative skills and knowledge of shop practices and school production work.

Tenth-grade students (seniors) mounting electrical equipment to study the practical applications of physics in a Moscow "ten-year" school.

Further, students in grades eight and nine are required to engage in practical work on collective farms and in industrial plants for 24 days at the rate of four hours per day at the end of each of these two years. A total of 192 hours for students in the upper secondary school is in contrast with 48, or at the most, 96 hours under curriculum Plan I. Likewise the time devoted to excursions has been increased from 188 to 191 hours per school year. There are optional practical courses for students of these grades totaling 170 hours per year.

Transition to the full polytechnical curriculum as envisaged by the government is not yet complete. There are 50 experimental secondary schools following an 11-year program. These schools require students in the last three grades to spend three days per week in school and three days per week at work in industry and in agriculture. It is believed that more and more of the schools will respond to the exhortation of the First Secretary of the Communist party by embracing Plan III for all students.

An example of work offered in the polytechnical curriculum under Plan II was observed in the city of Alma Ata in the Kazakh Soviet Socialist Republic. Ten-year school No. 25 has 1306 students in grades one through ten. Pupils in grades one to three have formal classroom instruction in crafts work using paper and clay. In grade four, woodcarving is offered. Pupils in grades five to seven have activities in the metal and woodworking shops. In grade eight it is machine building and, at the end of the school year, this class has agricultural practice on a farm for two weeks. It is said that this helps in the study of biology. In grade nine, students study elements of industry and engage in industrial practice (in local plants) once a week for four hours. At the end of this school year, there is industrial practice full time for two weeks. It is said that practice in machine repairs he'ps in the study of physics.

Industries Train Students

Vocational education in the Soviet Union is not a function of the Ministry of Education. Its main purpose is the training of skilled labor. Some voca-

(*Continued on page* 30)

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By Ira C. Madden

Crary School, Detroit, Michigan

MEASUREMENT is an important part of woodworking, as any woodworking teacher knows. And it is important that the teacher *knows* that his pupils know not only how to measure accurately, but also how to list the measurements in correct order. The measuring test shown here was developed with that idea in mind, to impress on the minds of all students that finished, accurate, and detailed dimensions must be given in a definite order. Fourteen items to measure are in a tray (see picture). The test on these items is shown at right.

When a student measures a block of wood, the first dimension is always the thickness. The second dimension is the width. The third dimension is the length. The second block in the tray of wood is wider than it is long so that the student must consider the grain of the wood in making the measurements. We have found it wise to fail students on the first three questions if they are not given in correct order (T x W x L).

When working Block 4, the first dimension on the chamfer is the distance on the face, and the second one is the distance measured down on the edge and end. A ¼" x ⅜" chamfer is a good size for this part of the test.

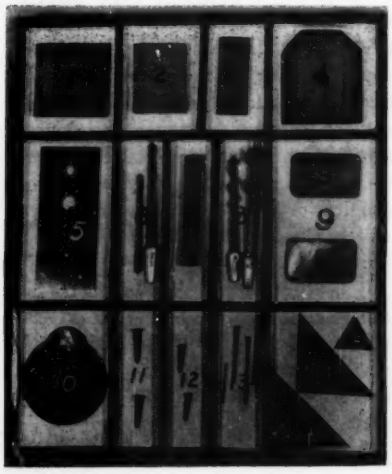
When laying out and measuring a miter corner, the first dimension listed is to be measured from the corner on the end, while the second dimension is to be measured from the corner back on the edge.

A bevel has one dimension and can be given in degrees or in inches. Since a bevel is an angle cut which extends from one face to the opposite face, the dimension should tell the distance to be measured back from the square edge or end.

The rest of the test, as can be seen, is for measuring other essential details of woodworking shop experience.

This test can be used either as an individual test or as a group test. When using it as a class test, it will be necessary to have more than one object for the parts that are most difficult or when many measurements are required, as in questions 4 and 5. The instructor will want to have the tray of objects at the

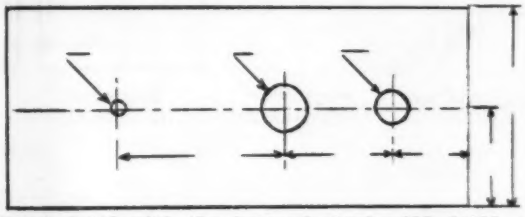
(*Continued on page* 30)



MEASURING TEST

This measuring test is given in the 7th grade as an initial test and in the 8th grade as a final test. You may use any tool or device in the shop while working these problems, and twenty-two minutes is the time allowed to make the 54 measurements. All dimensions must be reduced to their lowest terms and must be given in the correct order.

1. The finished dimensions of block 1 are _____ X _____ X _____.
2. The finished dimensions of block 2 are _____ X _____ X _____.
3. The finished dimensions of block 3 are _____ X _____ X _____.
4. The chamfer on block 4 is _____ X _____; the miter is _____ X _____ and the bevel is _____.
5. Dimension the following drawing



6. The twist drill with the tapered shank will drill a _____ inch hole; the one with the straight shank will drill a _____ inch hole.
7. The cylinder is _____" X _____".
8. The No. 10 auger bit will bore a _____" hole. The smaller auger bit is No. _____ and it will bore a _____" hole.
9. The rounded corner on block 9 is _____"; the rounded end is _____" and the angle at "A" is _____ degrees.
10. The large disc has a radius of _____" and the diameter is _____". The diameter of the small disc is _____". In laying out this sized disc, the wing dividers would be set at _____".
11. The No. 10 flat-head screw is _____" long. When setting any No. 10 screw, the shank hole will be _____" and the anchor hole will be _____".
12. The round-head blued screw is No. _____ and is _____" long. The shank hole will be _____" and the anchor hole for the threads _____".
13. The brad is _____" long; the finishing nail is _____" long; the 6-penny box nail is _____"long; and the 8-penny common nail is _____".
14. The small triangle is equilateral so each angle is _____ degrees and each side is _____" long. The other two triangles may be assembled to make a square. This square has (4) _____ degree angles and is _____" wide and _____" long. In each triangle there is one _____ degree angle and two _____ degree angles.

There are many advantages to using the "cave man" approach

Sketching as an Aid to Multiview Drawing

By George K. Stegman

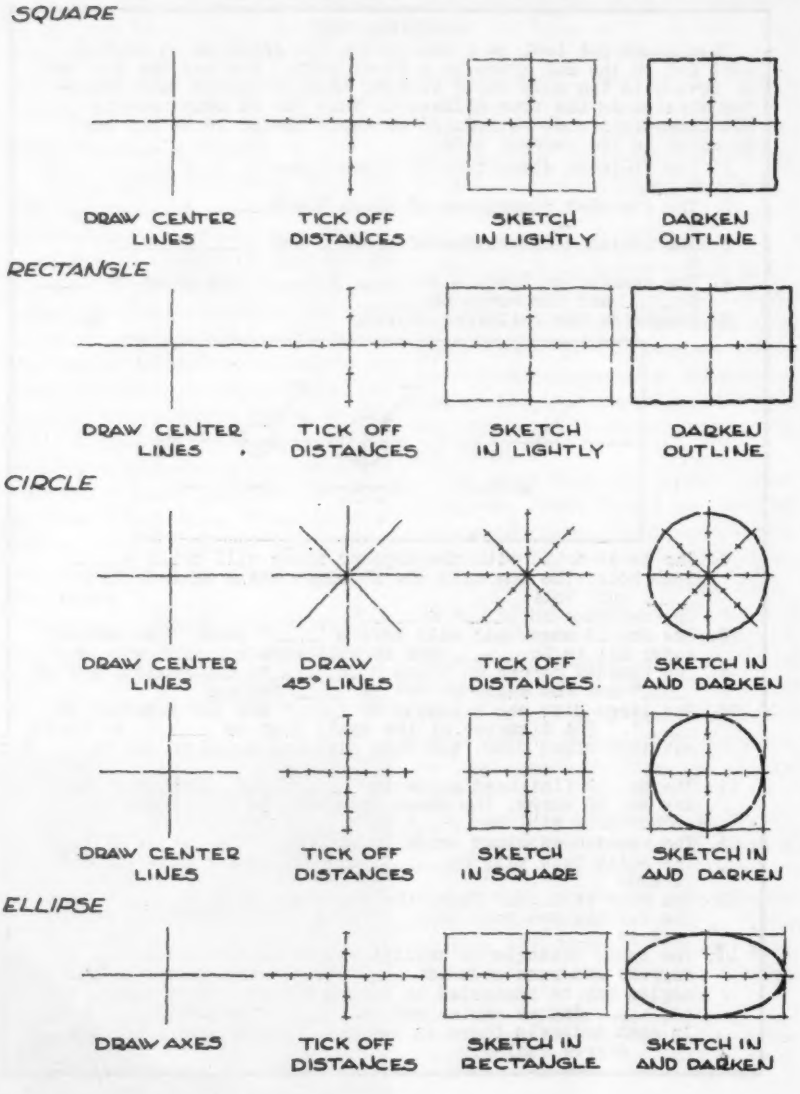
Assistant Professor and Chairman, Engineering Drawing Department, West Virginia Institute of Technology, Morgantown

CAVE drawings were probably the first known graphic representations of man."

How many times have you begun your course in mechanical drafting with this statement? Why not use this idea, *sketching*, to introduce multiview drawing? All of the principles of multiview drawing (placement and relationship of views, alignment, use of hidden lines, run outs, curved surfaces, theory of dimensioning, etc.) can be covered in a minimum time and will give maximum results and experience.

The student in industrial-education courses soon learns that there are certain skills, knowledges, and basic processes which must be mastered if he is to succeed. In mechanical drafting, success is dependent on comprehension of the multiview drawing area. But the conventional approach to the multiview drawing area, by using T-square, triangles, instruments, or a drafting machine, proves too cumbersome, since a sufficient number of problems cannot be accomplished. Sketching, however, will permit a greater range of representative problems in the multiview drawing field. I do not intend to imply that sketching should *replace* multiview drawing. Rather it should be used as an introductory measure.

Fig. 1. This chart shows the step-by-step process of developing the basic geometric forms used in sketching. These should be practiced before a student attempts to sketch any multiview drawing.



Many advantages may be gained by utilizing sketching as an aid in teaching the principles of multiview drawing. Following are eight of them:

1. *As an instrument of expression.*—Sketching is an instrument of expression relating an idea when the spoken word does not completely convey the thought.

2. *As a homework medium.*—Sketching may be used throughout the entire course as homework. One or two sketches in the area in which the class is working (sections, detail drawing, auxiliaries, pictorials, etc.) each week will give added experience and a deeper understanding of the work.

3. *As a dimensioning presentation.*—Possibly more questions arise pertaining to dimensioning theory than in any other area. Representative problems may be selected to illustrate various types of dimensioning practice. If the student has had previous training in sketching he may complete five or six sketched plates in contrast to one mechanical drawing. Therefore, the student will have a more inclusive background in problem solving.

4. *As a basis of simplified or functional drafting.*—Sketching is a basis for simplified or functional drafting, the new method of expression being used in various industries with varying degrees of success.

5. *As preparation for college.*—Many

Fig. 2. Using the sketch as a check prior to the actual drawing is one of the values of sketching.

proper alignment and placement of views. Coordinate paper will insure proper proportion and development of the object. When the student has gained sufficient experience in placement and alignment of views, plain white or buff paper (8½" x 11") may be used. Scale is not an important factor in sketching, since most sketches are not drawn to scale but only in proportion.

Assignment sheets may be devised by the teacher similar to the one illustrated in Fig. 3. Problems such as those illustrated may be used in classroom sketching, homework assignments, or in a unit test on sketching.

Sketching also may be used as a checking device, prior to the student making the mechanical drawing. This process will acquaint the student with any problems encountered in the drawing, and will teach him to sketch the drawing before starting out blindly. Sketching prior to drawing will also aid the student in spacing the drawing on the sheet. ★

colleges of engineering now include some form of sketching in the engineering drawing or graphics courses. The inclusion of sketching in the secondary-school mechanical-drafting course will aid the student planning to study engineering in college.

6. *As partial job preparation.*— Sketching is used in many shops by designers and foremen in virtually all fields. For example, sketching is used in such fields as printing, show-card writing, graphic analysis, and in the electrical, radio, plumbing, and building fields.

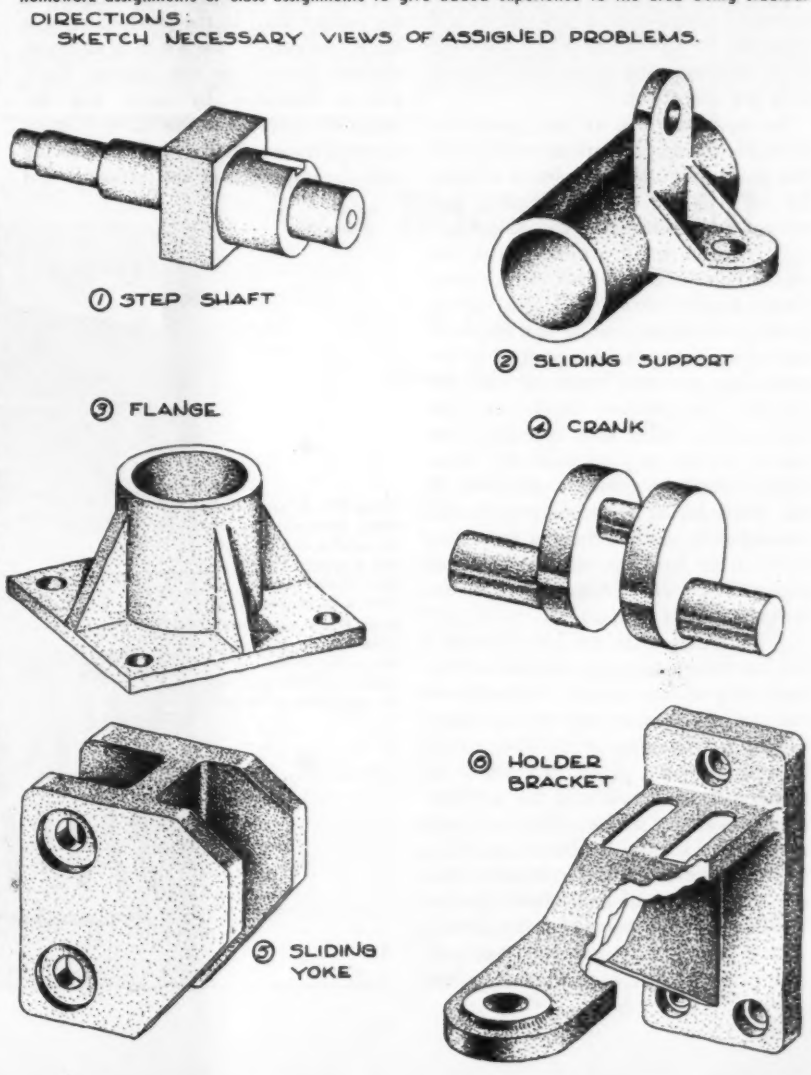
7. *As an aid for early drop-outs.*— Quite often students drop out before the semester or grade period ends, thus leaving with a fragmentary knowledge of the course. Beginning the mechanical drafting course with sketching will give the student a basic knowledge of graphical presentation in a relatively short time.

8. *As a discouragement deterrent.*— Sketching has proved to deter discouragement since the student can apply his knowledge of multiview drawing and obtain a product quickly.

Although sketching requires very little skill, a knowledge of the basic geometric forms is necessary. Fig. 1 illustrates the basic geometric figures which should be practiced before attempting to sketch any type of mutiview drawing.

When sketching is used as an aid in teaching multiview drawing, coordinate paper (⅛" or ¼" square) may be used to assist the student in obtaining the

Fig. 3. Problem sheets such as this may be developed and duplicated by the instructor for use as homework assignments or class assignments to give added experience to the area being studied.



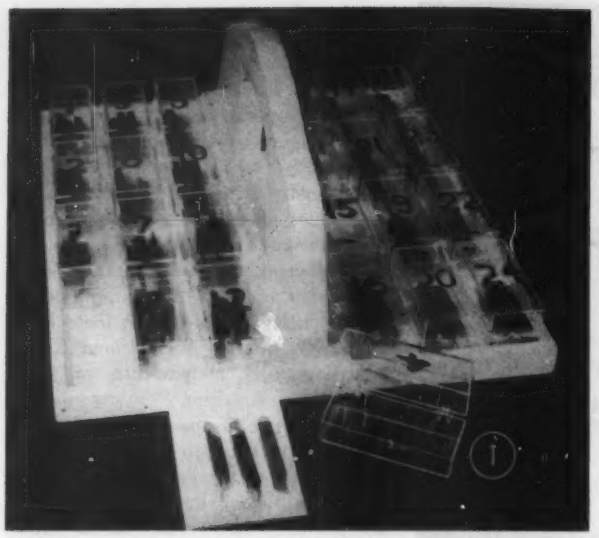


Photo #1: A set of three lathe tool bits is checked out to each beginning student at beginning of the period. They're in plastic boxes in this tray.

Some hints on simplifying

Tool Dispensing

By H. J. Gerber

Assistant Professor and Head of Machine-Shop Department, The Technical Institute, Oklahoma State University, Stillwater

ONE of the major problems in any large school shop—particularly a machine shop—is that of freeing the teacher from any sort of activity which might divert his attention from purely instructional efforts. I believe it will generally be agreed that tool dispensing is in the front rank as far as necessary evils are concerned.

In our department we have given considerable thought to various solutions to this problem. Some examples of successful methods for tool distribution and storage are illustrated in this article.

For use on small projects which are regularly made by students in beginning classes, I make use of "kit blocks" which contain all special tooling and standard cutting tools which are required in the machining processes involved with the project. The student checks out the whole block rather than spending time asking for one or more tools at a time. Often he will use most of the tools in the block during one class period and, consequently, he has them without frequent trips back to tool storage and without interrupting the teacher at his more important duties.

A set of three lathe tool bits is checked out to each beginning student at the beginning of the period. Orderly and efficient distribution and return is accomplished by keeping the three tools in a small clear plastic box which is inked with the number of the machine assigned to the student. The tool tray used to hold these boxes (photo #1) has a similar numbering system to identify the position of each plastic box as it is replaced at the end of the period. Just a quick glance over the tray will inform the teacher as to whether or not all tools have been returned properly.

Photo #2 illustrates another small hardwood block containing all of the smaller cutting tools and a special ball-gripping device. These tools are part of the tooling used in the production of a small toolmaker's vise which is an intermediate project in our classes. Each tool is identified by name and description stamped into the block. Cutting edges of these tools are easily visible for periodic inspection by the instructor and any missing tools are immediately noticed when the block is returned.

Similar open tool blocks are also very efficient for storing standard tools such as the set of small machine-screw taps and dies illustrated in photo #3. These tools are of a type easily lost or damaged and so it is important that they be contained in a manner which will permit the teacher to quickly check for missing or dull items.

Photo #4 illustrates a hardwood

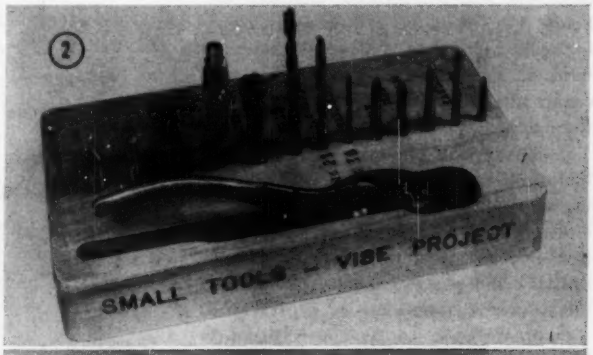


Photo #2: A hardwood block containing all of the smaller cutting tools and a special ball gripping device needed to make a toolmaker's vise.

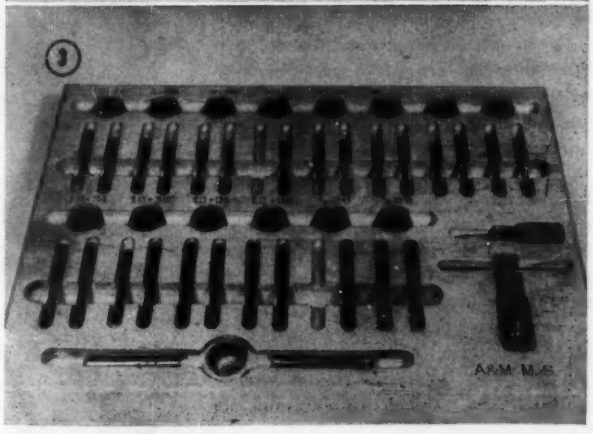


Photo #3: A set of small screw taps and dies efficiently stored in a wood trap with cavities for each item in the set.

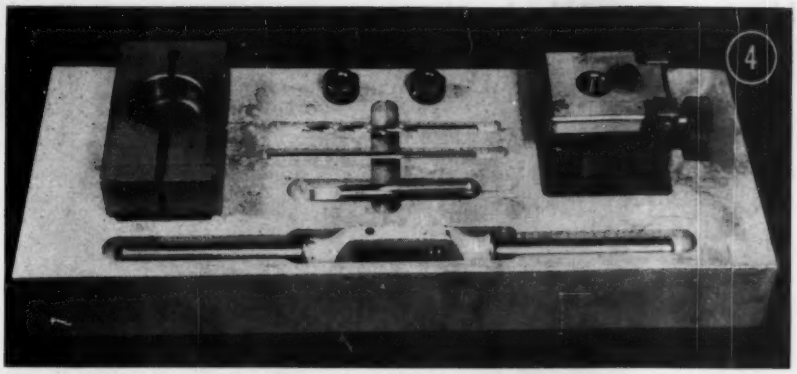


Photo #4: A hardwood block, with a number of cavities, contains a drill jig, fixture, jig bushings, drill, reamer, tap, and tap wrench. They're all required for three operations on a small jack screw.

block, with a number of cavities, which contains a drill jig, fixture, jig bushings, drill, reamer, tap, and tap wrench. All of these tools are required for three operations on a small jack screw, a primary project for all of our students.

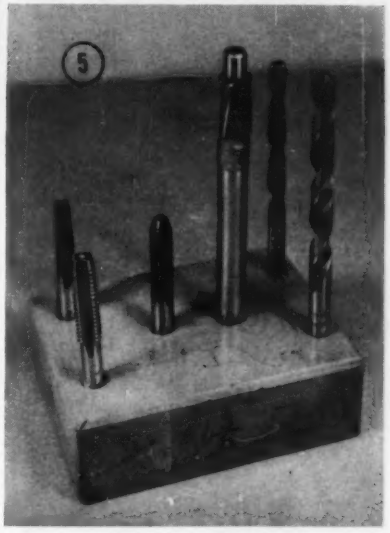
In our toolmaking activities, we make frequent use of Allen-type socket cap screws as fasteners. All of the tools—taps, drills, and counterbore for each size of screw—are kept in a simple wood block (photo #5) marked with the size of the screw for which the tools are used. The block is checked out as a unit rather than requiring the student or teacher to locate and check out six separate tools for the job.

Tool cavities in blocks like the foregoing are produced right in the machine shop by use of specially sharpened cutters in a high-speed vertical milling machine. I recommend this method for many woodwork problems of this sort and in pattern making, also.

While many plans for delegating tool dispensing and checking responsibilities to students have been in use, the fact remains that students, particularly beginners, are not and cannot be expected to be familiar with all of the small tools and accessories in the machine shop.

Just a little thought and a small amount of effort in planning and constructing equipment of this type will pay handsome dividends in time saved and in elimination of an unnecessary irritation for both the teacher and the student. ★

Photo #5: Taps, drills, and counterbore, for each size of the screw for which the tools are used, are kept in a simple wood block such as this.

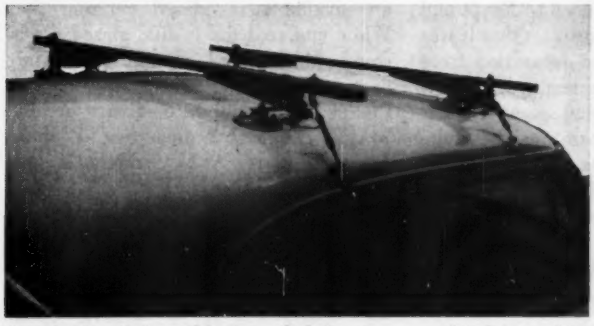


Your boys can now make a

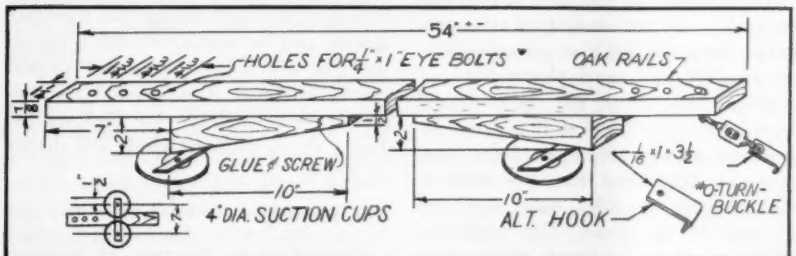
Car Rack for Dad

By E. R. Roberts

Whittier, California, High School



Completed rack that will fit the roof of almost every model of automobile.

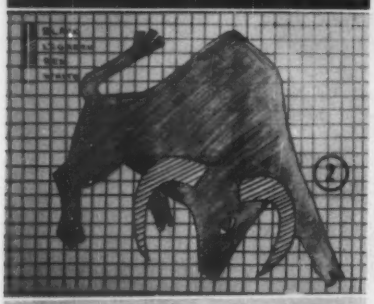


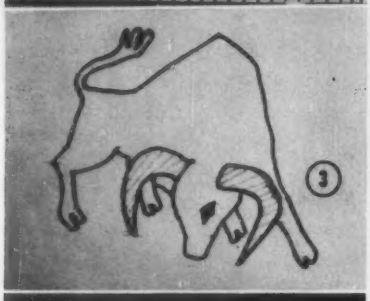
BILL OF MATERIALS				NOTES
AMT.	T. W. L.	MAT.	PART	
2		OAK	MAIN RAIL	HOLDS 12' BOAT
2		"	WEDGES EA.	APPROX. COST $5.00
2		C. R. S.	BRACKETS EA.	MAY BE ADJUSTED TO FIT ANY
4	NO. 0	ALUM.	TURNBUCKLES	CAR OR WAGON
8	4" DIA.	RUBBER	SUCTION CUPS	
-			MISC. BOLTS & SCREWS	

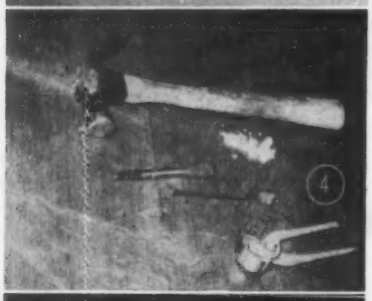
A VERY popular and useful project that can be made in the school or home shop is this car rack. It has been tested on almost every model automobile and station wagon, and will hold everything from lumber and pipe to a 12' boat.

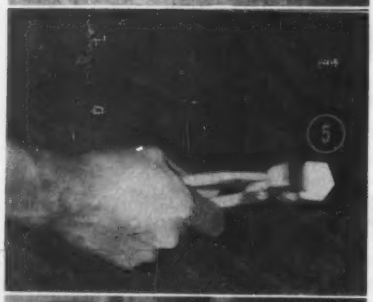
The four suction cups on each bar distribute the weight evenly on the top of the car. The gutter hooks and turnbuckles secure the rods when there is any side thrust.

All metals parts should be purchased already galvanized if possible. Both metal and wood should be given two coats of spar varnish before the rack is used. A few feet of cotton sash cord can be used to lash items to the carrier. The end result is one of the most useful items found around the home. ★









Ideas are liberated when you use

Mosaic Tilework in Industrial Arts

By C. Vernon Siegner
Colorado State University, Fort Collins

IS mosaic tilework here to stay or is it merely a fad that is enjoying a short-lived popularity?

Evidence from sales in hobby shops and craft suppliers shows that tilework is one of the most popular crafts today. Architects are using mosaic tile for both interiors and exteriors because the color and design possibilities of mosaic fit in with the simple undecorated lines of modern architecture.

Mosiac tilework is not a new craft. It is a revived craft that dates back to the Sumerians of 3500 B.C. Historians believe this craft advanced to Egypt and Europe with such enthusiasm that it was the favorite mural-type decoration from the fourth to the fourteenth centuries. The Renaissance period gave mosaics its death blow when painting and sculpture were found to be a much quicker method of graphic illustration. The revival of mosaics began during the 1920's in Mexico and by the 1930's had traveled to southern California and the rest of the United States.

Selecting Mosaic Tile

Three types of tile lend themselves favorably to the industrial-arts program; these are Venetian glass tessarae, ceramic tile, and vinyl plastic tile.

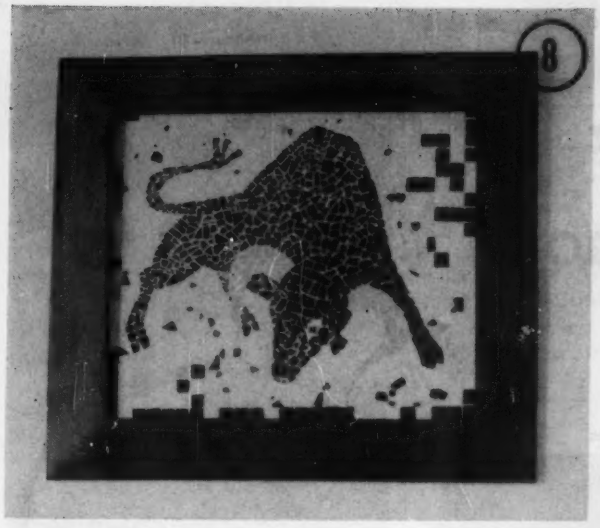
Glass (Venetian) tile is preferred over other types because it is irregular in shape, translucent, and reflects light, giving it life. Glass tiles are fired in molds with marble dust scattered throughout the glass. The craftsman should place the tapered edges down when making his design. Most glass tiles are imported from Italy or Mexico. The sizes of glass tile are $\frac{1}{8}$" thick by $\frac{3}{4}$" square for the Venetian, and $\frac{3}{8}$" thick by $\frac{3}{4}$" long and $\frac{1}{2}$" wide in Byzantine tesserae. Over 100 colors are available in glass tile and prices vary with colors. Warm colors cost more than cool colors. Prices range from $1.00 per square foot to $14.00.

Ceramic tile can be purchased in both glazed and unglazed surfaces. Unglazed tiles are porcelain, or natural clay tiles, with color throughout. They are used widely in the building trades. Because the shapes are cast, you can purchase tile in rectangles, squares, circles, triangles, and hexagons. Your color selection is limited to white, buff, tan, blue, pink, lavender, and gray. Over 60 colors are available in glazed ceramic tile. While unglazed tile is dull, glazed tile is shiny. Most glazed ceramic tile is imported from Italy, Mexico, Spain, and Puerto Rico. Ceramic tiles vary greatly in size. The most common are $\frac{1}{8}$" thick by $\frac{3}{4}$" square. A $\frac{3}{8}$" square is also available.

Vinyl tile offers vast possibilities for classroom use because it is the least expensive of the tiles. This tile is generally about 1/16" thick. Common sizes are $\frac{3}{8}$" square and 11/16" square. About 50 colors are available from suppliers. This type of tile is the easiest to shape. You can cut it with scissors for irregular shapes, and by heating it with a candle the tile will soften and bend around curved surfaces. Use a vinyl tile adhesive with vinyl tile for best results. Fig. 1 shows different kinds and shapes of tile.

Tile Projects

Depending on the type of tile you use, unlimited project possibilities are available to the student. Because of the brilliant colors, tile projects are popular for teaching color schemes as well as design. You may use tile with wood, leather, metal, or plastic. If you use



Directions for making this mosaic tile picture are detailed in the accompanying article.

glass or ceramic tile you have a colorful, weather-resistant, fireproof, stainproof, and heat-insulating surface. Table tops are virtually indestructible to scratches; serving trays are durable and easily cleaned; hot-plate holders are functional as well as colorful; ash trays are heat proof and easily cleaned; fruit bowls will not stain.

Let's Make a Tile Project

First work out a suitable design for your project on graph paper. Have each square on the graph paper represent a tile or portion of a tile. Then work out a harmonious color scheme. Remember cool colors are much cheaper and can be easily adapted for backgrounds and large areas. Fig. 2 shows the design for a tile wall picture drawn on graph paper. The picture is a design of a Spanish bull that was modified from that of a travel poster. Colors selected include black for the bull, red for the eye, light green for the horns, and white with pieces of red, black, and light green scattered throughout the background. Glazed ceramic tile was selected for all of the design except the horns—they were done in light green glass tile for contrast.

After sketching your design on graph paper, draw a full-scale drawing on plywood or hardboard backing. Use of a grease pencil or India ink gives a clear outline which is easy to follow. Tempera paint or water colors can be used on the backing to aid you in the selection of color. After you have drawn your design, coat your backing with a sealer coat of finish, such as shellac or lacquer. The sealer coat prevents tearing the wood if tile must be moved. It also prevents the adhesive from soaking into the backing. Fig. 3 shows the sketch on plywood. The plywood selected was 3/8" thick by 19" x 24".

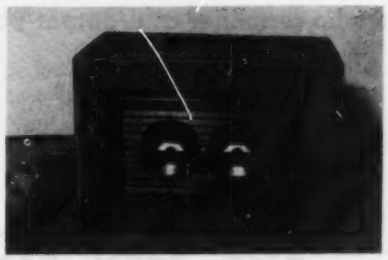
Start placing pieces of tile on your drawing, working from the outside toward the center. For curves and angles break tile with one of the tools shown in Fig. 4. For small accurate cuts, nippers are preferred as shown in Fig. 5; however, the hammer is quicker for many large pieces and the chisel and glass cutters are also handy for odd irregular shapes.

When you are satisfied with your pattern, place an adhesive on your backing and press the tile down firmly for a good bond. Space each tile approximately 1/16" apart, using a block to level tile periodically as shown in Fig. 6. Most cements harden in about half an hour so don't try to cover too large an area at one time. Contact-type cements are good for glass and ceramic tile.

After assembling the tile and allowing adequate time for the adhesive to dry, you can fill cracks between the tile with grout—a mixture of Portland cement and plaster of Paris. Use about one pound of grout to cover every two square feet of loose tile. Mix the grout with water to a thick consistency and be sure no lumps are visible. Use your hand to apply the grout into every crevice as shown in Fig. 7. Coloring agents may be added to your grout mixture.

Allow about 20 minutes drying time for your grout and wipe with a sponge or damp rag to remove the residue. After an hour, remove the film from the tile by polishing it with a soft cloth. Twenty-four hours later, wax the surface to complete your project.

Fig. 8 shows the completed picture mounted. More than 500 pieces of tile were used. ★



Students like to make this handy extension box which is useful for teaching basic principles.

Extension Box

By Kenneth Folster

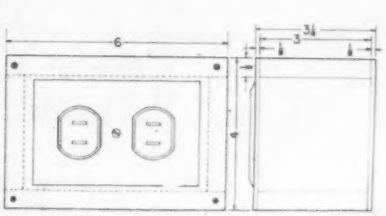
Arlington High School, Poughkeepsie, N.Y.

THIS extension box has so many uses that it has become a very popular project in our electricity classes. It is very useful around the home and school where the traditional extension cord is not long enough or sturdy enough to do the job.

Educationally the project is an excellent starting point in teaching electricity, as it is a simple circuit that can be used for teaching Ohm's law, the current-carrying capacity of wire, how to wire an outlet, the underwriter's knot, and many other basic lessons, both practical and theoretical.

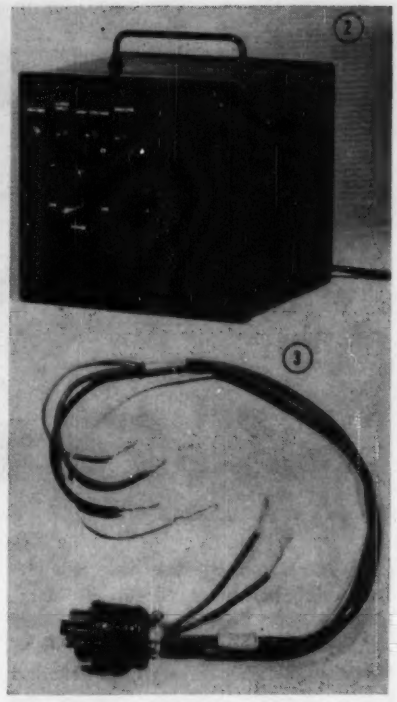
The construction of this project as well as other electrical projects in our shop is simplified by the use of pre-cut plywood parts and pre-cut Masonite panels. By using a modular system of sizes, the same parts are suitable for several projects. This reduces the woodworking involved so the instructor and student can concentrate on the electrical aspects of the project.

A suitable finish such as black wrinkle varnish is applied after the project is completed and inspected and OK'd by the teacher. This is a basic project so no attempt is made to include a fuse or switches. However, students are encouraged to incorporate such items into more advanced power panels of their own design. ★



Audio amplifier and output power cable are included in this

Power Supply for the Radio Shop



By A. B. Crawford

Herbert Hoover High School, San Diego, California

SHOP power supplies for testing radio receivers are one of the most used pieces of equipment in an elementary course in radio. Since it is common practice with beginning students to construct receivers without a built-in power source, an outside power supply is a necessity.

A common supply with a distribution system that will feed several receivers at one time will do fairly well. There are, however, several disadvantages to this system. First, by necessity, students testing receivers must be closely grouped together, causing a "traffic" problem.

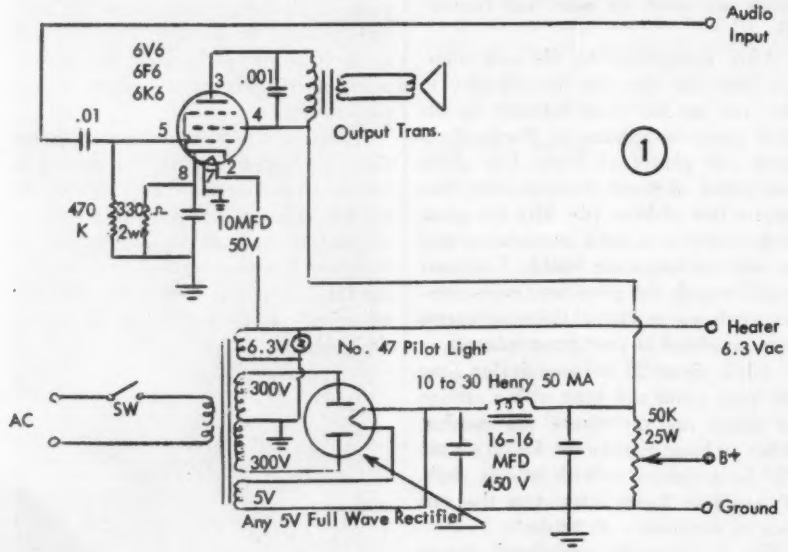
Second, and more frustrating, is the trouble that comes about from shorts in high voltage or heater wiring in student receivers. Shorts of this nature will kill the whole system and cause howls of rage from the student who was listening to his favorite ditty.

For the above reasons, individual power supplies that can be used on any bench offer a more flexible system. There is no doubt that they are more expensive and are far from fool-proof. It would be the ultimate if high-voltage and heater circuits were equipped with circuit breakers which would flash red lights and sound a blaring horn. It might wake up the dullard who shorts out the power supply and allows it to stay on while he spends ten minutes trying to figure out what is wrong and what is causing that funny smell.

Fuses Are Costly

Of course, supplies can be fused, but it will require a large stock of fuses and frequent interruptions for fuse replacements. Probably the best solution for reducing the abuse heaped on the poor power supply is continual talks and demonstrations on receiver trouble-shooting. This will pay off in more ways than just saving a power supply from becoming an over-heated casualty.

A feature of individual power supplies that can be added with a few more parts is a one-stage power audio amplifier. The addition of this feature will make your students happy and you slightly deaf. Nothing like keeping up on the latest in "rock 'n roll." It will make it possible for a one-tube regenerative set to be heard without headphones and a two-tube set to bellow. The amplifier-power supply circuit is conventional (Fig. 1). Any variety of audio power tubes may be used with equal success.



A COMBINATION POWER SUPPLY AND AUDIO AMPLIFIER

About Bleeder Resistors

Since the amplifier tube will act as a bleeder across the high voltage, no bleeder resistor is needed if you do not wish to reduce output B+ voltage below transformer rating, usually around 200 to 300 v. The drawing shows a 50K, 25-w adjustable bleeder in the circuit in order to have the output of the high voltage not over 150 v. If the power supply is built without an amplifier, a bleeder of some sort is highly recommended.

While lack of this load resistor will help keep your students awake when disconnecting power leads, it also has the bad habit of biting the instructor during forgetful moments. If you are hard up for parts, use any resistor of about 100K across the B+ to help discharge the filter condensers after power has been turned off.

Output terminals or binding posts for

power should be plainly marked and made with plastic fasteners to reduce shock hazard. The supply can be housed in a metal cabinet. Cases from war surplus equipment, cut down in size if needed, and, with a front panel made to fit, make a cheap enclosure. Allow for ventilation. Completed amplifier-power supply is shown in Fig. 2.

After you have your power supply the next problem is an easy and quick way to connect power leads between power supply and radio set. The method to be described and shown (Fig. 1-A) has been found satisfactory in use, is simple to construct and maintain. If this system is to be used on shop-constructed radio sets, it is first necessary to use a standard octal socket for power connections on all sets designed to be powered by a shop power supply.

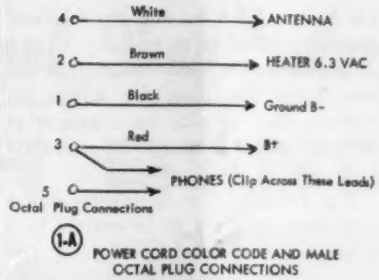
A cheap eight-pin octal socket is mounted on the rear of the radio chassis. Heater, B+, antenna, and ground connections are soldered to appropriate pin numbers. Standardizing pin connections of power sockets and plugs make it possible to connect and disconnect any radio easily and quickly.

Color Code

To make up the power cord use the pin numbering shown in the drawing (Fig. 1-A) to connect the wires to the male octal plug. The wires should be flexible and color coding saves labeling each wire as to its function. The antenna connection is brought out through the power plug to save making an antenna post on the receiver chassis. The red B+ lead goes into pin #3 of the plug along with a short piece of wire which is brought back out of the plug.

Another short piece of insulated wire is soldered by itself into pin #5. You now have a power cord consisting of four long wires and two short. Three of the long wires go to the power supply, the other one to antenna. The two short wires are for headphone connections and, if headphones cords are equipped with insulated alligator clips, they are easily clipped to these wires. When phones are across these two wires, the B+ circuit is completed to pin #5 of the power plug (Fig. 3).

Now consider the power socket on the back of the receiver chassis. It is evident that when the headphones are clipped into the power cord B+ will appear on pin #5 of the socket. This pin is then connected to the plate of the detector tube on a one-tube radio. In the case of multi-stage sets, it is always connected to the plate of the output tube. B+ for all other



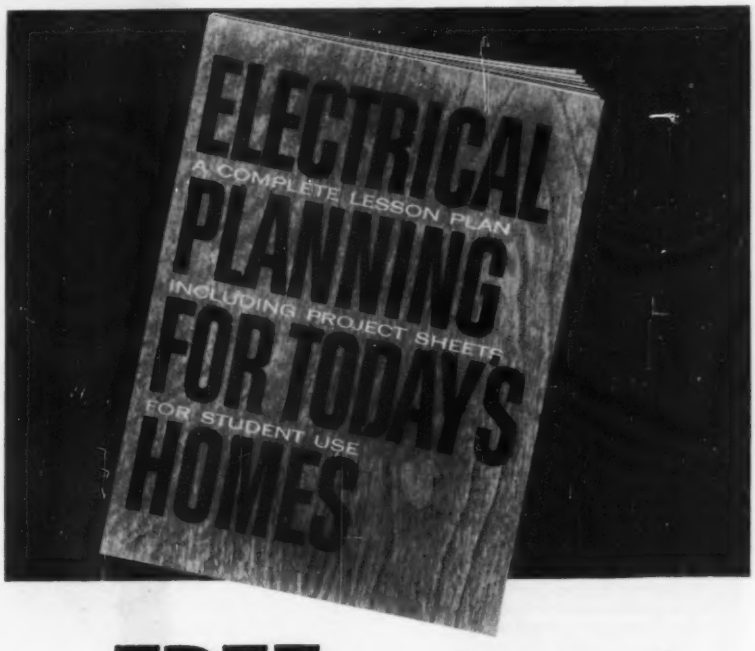
1-A POWER CORD COLOR CODE AND MALE OCTAL PLUG CONNECTIONS

stages is taken from pin #3 which goes through the power cord directly to the B+ on the power supply.

Cheap and Simple

This circuit arrangement will solve the problem of mounting and insulating headphone jacks and antenna posts on a metal chassis. It is a cheap and easy hookup and, except for the fact that the phones are hot, has proven very satisfactory.

To use the amplifier section of the power supply, the phones are left in place and a jumper hooked between plate side of headphones and audio input terminal of amplifier. If desired, a resistor plate load may be substituted for the phones. ★



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Diamond Dust

Abrasive comments from that doughty Scot, Tom Diamond, former head, Department of Vocational Education, University of Michigan, Ann Arbor.

Ladies, Please Note

GENERALLY speaking, conventions are designed either for male or for female participation. For example, the P.E.O. and the Daughters of the American Revolution are primarily female, while the A.V.A., the A.I.A.A., and the veterans' conventions tend to be male.

Notwithstanding this tendency, it has been noted that, save for a few exceptions, the opposite sex manages to horn in on the activities, regardless of the gender of the meeting.

It is difficult for us to imagine how a mere man arranges to be invited to a women's convention, and it is still more difficult to determine why he would want to attend anyway. On the other hand, there are various reasons—all of them elementary—why there is usually a horde of women attending the A.V.A. and the A.I.A.A., both essentially male events. The presence of some of the ladies at the A.V.A. may be explained by the fact that a few of them are present because of their affiliation with the field of home economics or trade training for girls. It may be said in passing, too, that the influence of these few over the affairs of the organization is greatly out of proportion to their numbers. However, the same cannot be said of the A.I.A.A., since the number of women who are teaching industrial arts is so small that if all of them attended the number would be insignificant.

It is generally a poor policy to ignore women. Some refuse to be ignored, while others consider the source and are not disturbed by the lack of attention. Since they refuse to be annoyed, it may be of interest to turn our attention to the reasons why so many unaffiliated women attend our conventions, notwithstanding the male characteristics of the events.

In the first place, most of them attend because they have a good time. Provision is made for their entertainment. This makes it unnecessary for them to attend the meetings, and it softens the shock when friend husband announces, immediately after breakfast, that they must separate because he will be busy until midnight. But where does this interest start and how do they find out about the entertainment? It is really surprising how news gets around.

We cannot say with any degree of assurance, but we suspect that the ease of communication by telephone is responsible for the wide dissemination of information concerning convention activities for the ladies. As the date of the convention approaches, Mrs. X calls Mrs. Y and inquires:

"Are you going to Buffalo?"

Mrs. Y's interest is aroused—she will go anywhere with anyone—but, she asks, "Why should I go to Buffalo?"

Mrs. X replies, "Why, don't you know that the A.V.A. is to meet there at the end of the month?"

"Oh, sure, I know that, and John is going to it, but why should I think of attending?"

And then there follows a barrage of chattering which culminates in Mrs. Y announcing, in a determined voice, "Just wait until the big lug comes home and we will see if he can explain why, all these years, he has maintained that the A.V.A. is a meeting for men."

While the distaff side has some influence on the number of ladies who attend, it is our conviction that there are some men who, unwittingly, expose the arrangements for women by thought-

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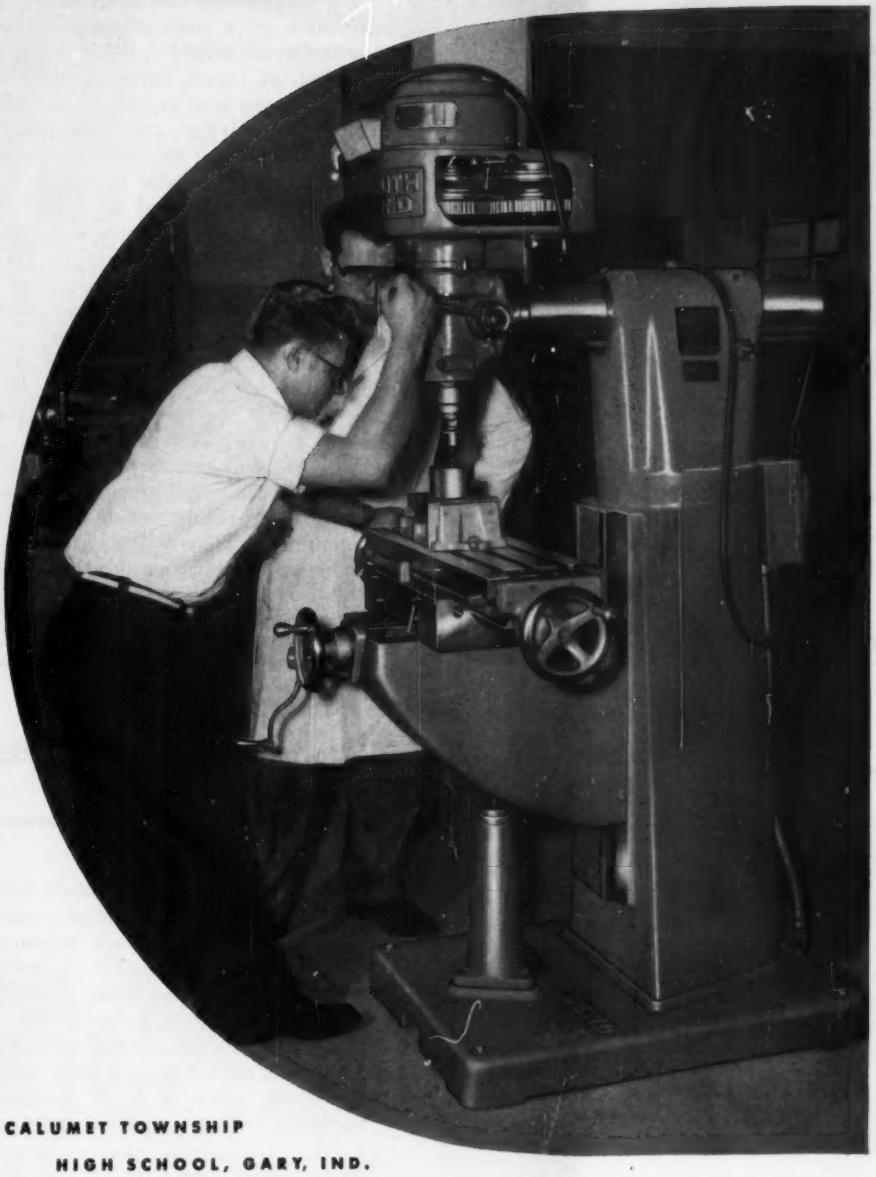

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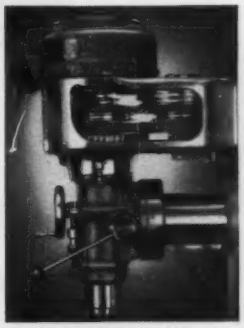

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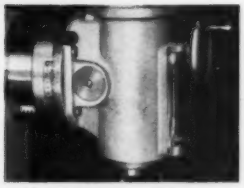
Head Rotates

Works at any angle through full 360°. Holds setting even when moved in and out — ram does not turn. No resetting.



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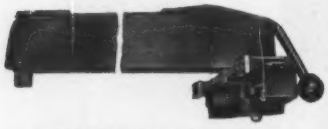

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It's unmatched for safety. Has exclusive clear-vision guard, double locking fence, big mitre gauge with 8¾" x 2" face. Motor enclosed in base.

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lessly leaving their programs lying around loose in the family mansion. Friend wife—who, by the way, can read—discovers what she has been missing and straightway registers a vow that, henceforth, she will be one of the party. We have no fault to find with this decision, but what we might say about the careless character who contributed to the dilution of a male organization had better be left unsaid.

And, of course, some of the ladies have learned from experience that when their husbands are on the loose, they are prone to indulge too freely in the cup that cheers — and also inebriates. This tendency is intensified when the dear boy is free from the effective supervision that can be supplied only by his better half. She recognizes the weakness so she tags along for the specific purpose of riding herd on the old boy, lest he embarrass her by landing in the hoosegow.

Whatever the reason for their presence may be, we have them with us. Who will deny that they lend dignity to the organization and provide the charm, grace, and beauty which most men admire? In view of this, let us have more women at our meetings and it will follow as night follows day, we will have more men. ★

Here Is a Way . . .

to publicize your industrial-education program

Publicity Brings Publicity

An article published in SCHOOL SHOP about a teacher-coordinator program in Battle Creek public schools' industrial-education program resulted in a two-column article in *The Battle Creek Enquirer and News*, Battle Creek, Mich.

The article, as it appeared in SCHOOL SHOP, was the jumping-off point for an interesting profile on A. W. Anderson, coordinator. This warm story appeared in the newspaper's feature "Mainly about Folks."

"Tomorrow's Craftsmen Today"

The theme, "Tomorrow's Craftsmen Today," highlighted the dramatic presentation of student work in industrial-education programs of the Los Angeles city schools held recently at the California State Museum of Science and Industry. Open to the public, the show illustrated the complete educational program in industrial arts from the elementary grades through junior colleges. ★

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L. R. Kohler, Director
Vocational Education

August 19, 1958

Mr. Howard Mauche, President
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Dear Mr. Mauche:

Since the end of World War II, the industrial and military technical advances have made it necessary for vocational schools to turn out a well rounded product that can quickly adapt himself to changing production and control techniques. This calls for a well rounded course in the electrical-electronic field. I found that the best way to accomplish good teaching in this field is to give the students materials and equipment to teaching with that will retain their interest and at the same time familiarize them with real electrical-electronic equipment that was designed for shop experiments.

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Student interest is unusually high when they are allowed to work with this equipment and the learning process is greatly aided.

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happenings in industrial education

Arc Welding Winners

A TOTAL of 106 high-school students studying shop mechanics in agricultural courses shared national honors in the 1958 annual arc welding award competition sponsored by The James F. Lincoln Arc Welding Foundation of Cleveland, Ohio. Winners came from 22 different states.

First award of $600 went to Gerald Riddle of Mead, Wash., for his entry of a hay conveyor. Curtis Gardner of Miltonvale, Kan., received the second award of $400 for a welded drill press entry. Steve Cooper of Eugene, Ore., and George Ortman of Yakima, Wash., each received a $200 third award. Their entries were several projects ranging from a trailer to a camp stove.

The shop teachers of each of these students received an equal amount of money for their schools to be used to improve shop courses.

The Foundation annually awards $7,000 in cash to students and high schools in a competition for farm boys to make welded shop projects and write an entry describing them.

The 1959 competition will close on June 15, 1959.

AVA Sets Dates

THE American Vocational Association has announced the dates and places for the association's conventions for the next three years.

The 1959 convention will be held Dec. 7-11 in Chicago, Ill. The 1960 convention will be in Los Angeles, Calif., from Dec. 5-9. And the 1961 meeting will be held Dec. 4-8 in Kansas City, Mo.

Oklahoma Assn. Elects

L. V. BALLARD of Oklahoma City has been elected president of the Oklahoma Trade and Industrial Education Association for 1959.

Other officers are: Ed Schirmer of Muskogee, vice-president; Harold Head of Hobart, secretary-treasurer; and Joe W. Lemley of Tulsa, John E. Hart of Henryetta, Ray Cox of Marlow, and Carl Jones of Sayre, directors.

More Than Shop Work

THE need for a broad education in the physical and social sciences by young people entering the graphic-arts industry was a major conclusion of a group of representatives from printing plants in the U.S. who recently met at Carnegie Institute of Technology, Pittsburgh, at the annual Invitational Conference of the Education Council of the Graphic Arts Industry.

The meeting was held to discuss and plan related educational and training programs for on-the-job trainees in the graphic-arts industry. Chairman of the conference was Leslie C. Shomo of the National Publishing Co., Washington, D.C., who is president of the Education Council.

"The rapid introduction of new processes, techniques, and equipment throughout the graphic-arts industry not only requires a high quality of craftsmanship ability but also a high degree of technical competency," stated Mr. Shomo. "Our deliberations at this Conference have demonstrated that it is no longer sufficient for students to spend the major part of their secondary-school life in the shop—there must be more time in the classroom and laboratory."

North Carolina Officers

KENNETH G. MANN of High Point has been elected president of the North Carolina Industrial Arts Association for the 1958-59 school year. He succeeds Tom C. Shore, Jr., of Lexington.

Other officers of the association for

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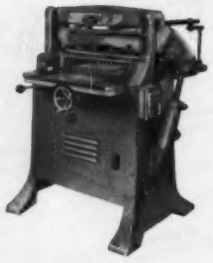

CRAFTSMAN 26½" LEVER CUTTER

Where power cutting is not required the C & P 26½" lever cutter handles an astonishing amount of cutting. Every feature of construction aids the operator. The knife bar linkage provides greatest possible cutting leverage. A counter weight balances the knife bar and keeps the knife from falling. Cut can be accomplished without undue reaching or stooping.

C&P BENCH CUTTER

This cutter is designed for installation on bench or cabinet. The knife cannot fall accidentally nor cutting handle be pulled down until safety lock is held open by operator's left hand at start of each cut. The cabinet is optional equipment. Two sizes: 19½" and 23". Cuts and trims sheets up to 19" x 24" or 23" x 24".

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this year are: Jesse R. Dills of Charlotte, vice-president; Tom Haigwood of East Carolina College, Greenville, secretary-treasurer; and Carroll Smith of Laurinburg, committee member.

The association, as one of its activities, each spring sponsors a project fair. The seventh annual fair, held last spring, attracted more than 375 entries.

New Building at Stout

A MULTI-STORY shop and classroom building will soon be under construction at Stout State College, Menomonie, Wis. The building is one of several now well into the drafting stage, according to school officials.

More than $1,125,000 in new facilities will be put into use at the college this year to help meet the needs of its rapidly expanding student population.

Foundry Workshop

A WORKSHOP in foundry activities, sponsored by the Trade and Industrial Service, Illinois State Board of Vocational Education, assisted by the American Foundrymen's Society and the University of Illinois, was held at the University of Illinois in August.

IA Vacation Workshop

FLOYD WURSCHER, industrial-arts instructor at Gaylord, Minn., and Fred Rowell, industrial-arts instructor at Richfield, Minn., again will be chairman of the annual Industrial Arts Vacation Workshop to be sponsored next summer by the Birch Coulee Industrial Arts Club in cooperation with the Bemidji State College and the Minnesota State Department of Education.

Convention Calendar

Missouri Vocational Association, Municipal Auditorium, Kansas City, Nov. 5-7.
Iowa Industrial Education Association, Hotel Savery, Des Moines, Nov. 6-7.
Kentucky Industrial Education Association, Kentucky Hotel, Louisville, Nov. 7-8.
Mississippi Valley Industrial Arts Conference, La Salle Hotel, Chicago, Ill., Nov. 13-15.
New England Industrial-Arts Teachers Association, Eastland Hotel, Portland, Me., Nov. 14-15.
California Industrial Education Association, Civic Auditorium, Stockton, Mar. 13-14.
Ohio Industrial Arts Association, Neil House, Columbus, Mar. 19-21.
New Jersey Vocational and Arts Association, Asbury Park, Mar. 19-21.
Illinois Vocational Association, Pere Marquette Hotel, Peoria, Mar. 19-21.
American Industrial Arts Association, Long Beach, Calif., April 22-26.

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By Dwayne Gilbert

Assistant Professor, Northwestern State College, Natchitoches, Louisiana

THE storage problem is a very non-discriminatory one. It strikes all of us. Our school, like yours, is crowded and storage space is at a premium. In the never-ending search for the answer to this national problem, we designed the tool panel shown below.

We are fully aware of the fact that our design is not revolutionary in concept or execution. For that matter we grant that perhaps to some it may be even "old stuff." But, it did answer a definite need in our shop and perhaps it will in yours, too.

The tool panel shown has an apron. Below the tool-storage part are two cabinets. One has shelving and is ideal for storing fruit jars in which fasteners, nails, screws, and small hardware is kept.

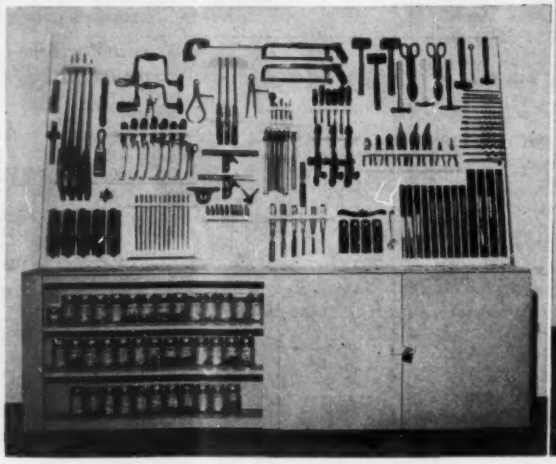
The other side is general utility storage space that can be used for projects and/or larger pieces of equipment, etc.

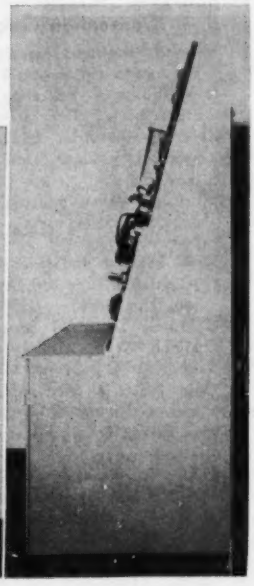
The entire unit is mounted on casters. This makes it a relatively simple matter to move the unit about the shop wherever it can be put to best use.

More important, the casters make it possible to get to the back which also has several cubic feet of storage space. Note that the shelving in the lower part does not extend all the way to the back of the cabinet. Likewise the shelving on the back—opposite the front shelving—only goes so deep, too. Behind the space where the tools are hung—the top part—is room for even more shelving on the back.

We have found this panel a tremendous aid in our storage problem. Perhaps you can use it as it is; perhaps you can modify it and come up with something even better. Whichever the case, help yourself. ★

Below is a front view of the portable tool-storage panel showing the storage provided on shelves below. At right is an end view of the same storage facility showing the width of the unit, thus giving you a better idea how deep the shelving is below and what the storage facilities are in the lower part. Please note it is on casters.





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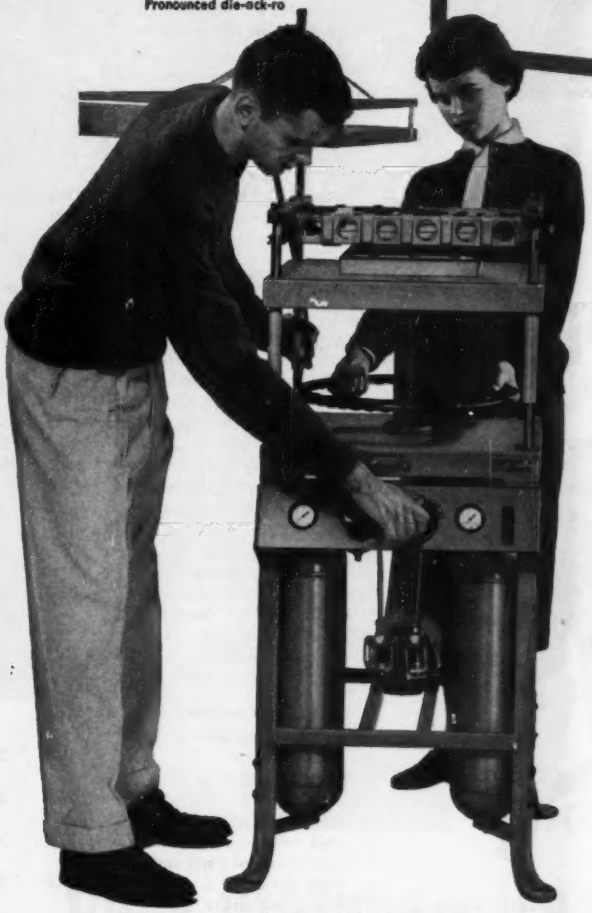
di-acro plastic press



This Di-Acro Plastic Press Model No. 18 comes complete with press, bench, powered pressure-vacuum unit and heater panel as illustrated above.

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Have you ever wondered

What to Stress in Electronics?

By Chester H. Gausman

Director of Vocational Education and Industrial Arts, Lincoln, Nebraska, Public Schools

INTERVIEWS with electronics instructors in selected trade and vocational schools in the Midwest and Far West and with electronics technicians in radio and TV repair shops in Lincoln, Neb., revealed what they would emphasize in developing teaching units in electronics. (The percentage ratings indicate what part of the group interviewed would stress the specific topics listed at left.) The results follow:

	Technicians	Teachers	Total
	%	%	%
Training in use, operation of equipment			
Multimeter	87.5	92.3	90.5
Signal generator, am and fm	18.5	26.9	23.8
Signal generator, sweep	6.2	11.5	9.5
Oscilloscope	25.0	26.9	26.2
Battery eliminator	0.0	7.7	4.8
Signal tracer	12.5	11.5	11.9
Tube tester	18.5	15.4	16.6
Training in use of manuals, servicing aids			
Rider's Service Manual	12.5	23.1	19.0
Sams' Photofact	50.0	34.6	40.5
Mallorys Red Book	0.0	0.0	0.0
Tube manuals	31.8	65.4	52.4
Supreme diagrams	0.0	3.8	2.4
Manufacturers service manuals	31.8	11.5	19.0
Technical knowledge			
Thorough understanding of schematic reading	43.8	65.5	57.1
Vacuum-tube theory	62.5	46.1	52.4
Circuit theory	50.0	61.5	57.1
Parts-substitution methods	0.0	11.5	7.1
Tube-substitution methods	0.0	7.7	4.8
Diagnosing receiver troubles	25.0	30.8	28.5
Practical experience in repair	25.0	30.8	28.5
Dynamic-voltage checks	6.2	46.1	31.3
Signal tracing and injection methods	6.2	23.1	16.6
Static resistance checks	00.0	30.8	19.0
Nontechnical knowledge			
Completion of necessary business forms	37.5	19.2	26.2
Advance estimation of repair costs	31.8	26.9	28.5
Maintenance of equipment and tools	37.5	57.7	50.0
Maintenance of parts and tube inventory	25.0	34.6	31.3
Proper competitive practices	18.5	26.9	23.8
Personal qualifications			
Neatness of appearance	37.5	65.4	54.8
Neat and orderly shop	12.5	46.1	33.3
Promptness	43.8	38.4	40.5
Continuous productive activity	12.5	23.1	19.0
Ability to meet customers satisfactorily	81.2	30.8	50.5
Speed in job completion	12.5	15.4	19.0
Overall view			
Personal qualifications	43.8	61.5	54.8
Nontechnical knowledge	0.0	3.8	2.4
Technical knowledge	50.8	46.1	47.8
Training in use of manuals, servicing aids	12.5	15.4	19.0
Training in use, operation of equipment	31.8	30.8	31.3 ★

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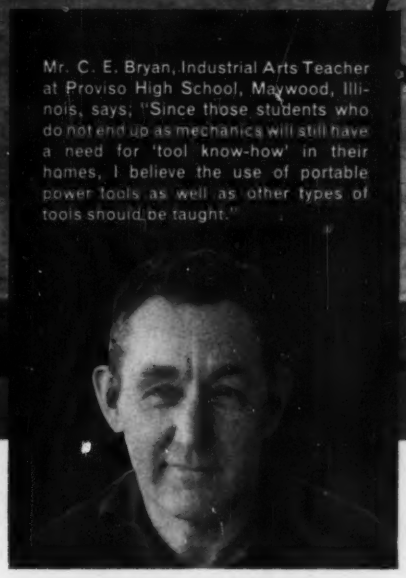

Mr. C. E. Bryan, Industrial Arts Teacher at Proviso High School, Maywood, Illinois, says; "Since those students who do not end up as mechanics will still have a need for 'tool know-how' in their homes, I believe the use of portable power tools as well as other types of tools should be taught."

Make "shop" useful for a lifetime...teach SKILMANSHIP!

A new trend is starting in "shop" curriculum: Teach portable as well as hand and stationary power tools. Many homeowners have adopted a "do-it-yourself" program to save money. Portable power tools help them save hours of tedious work. The young men of today will be the "do-it-yourself" group tomorrow. They will appreciate the Skilmanship and safety you taught them in school, and the value of quality tools—SKIL sanders, routers, planes, drills, saws. (*Tools shown: Model 857 SKILSAW, 297 Router, 805 Belt Sander, 75 Drill.*)

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A complete range of these classroom projects is available free from Reynolds. Put them to work for you. Then watch how students advance in plan reading, drilling, tapping, bending, shaping and bench wor skills. Use the handy coupon for your complete set free Project Sheets. Mail it now!

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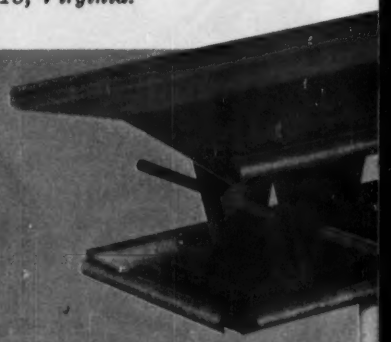
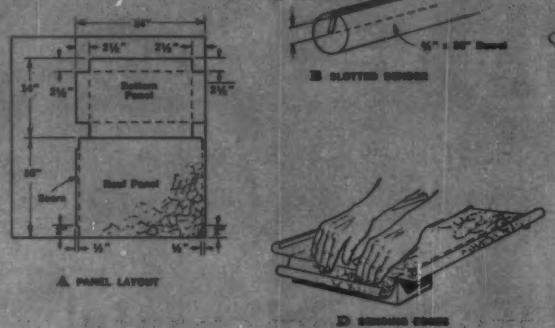
Reynolds Do-It-Yourself Aluminum BIRD FEEDER





Since you can see the food in the hoppers of this feeder, you need only to service the feeder when the seed is low. It is a good rain-guard, too, complete with gutters.

MATERIALS LIST

1 pc.	36" x 36" Do-It-Yourself Leather Embossed Aluminum Sheet	1	¾" x 36" Wood Dowel Rod	1 pkg.	⅛ x 3/32" Aluminum Rivets	12	½" or ⅝" Brads
1 pc.	1 x 6 x 48" Redwood	4 pcs.	5" x 5⅞" Single Strength Glass	1	1¼" O.D. Aluminum Tubing 6 ft. long	2	4d Finishing Nails
1	½" x 36" Hardwood Dowel Rod	1 pkg.	#6 x ½" Aluminum Sheet Metal Screws	1	1¼" Aluminum Floor Flange	8	6d Common Nails
		1 pkg.	¼–20 x 1½" Aluminum Bolts			4	4d Finishing Nails
							Finish for Redwood (Spar Varnish, etc.)

Construction Procedure

1 Using ordinary household scissors, cut a 14" x 24" aluminum sheet for the base and a 19" x 24" sheet for the roof, notching the corners (Fig. A).

2 Cut a slot ⅛" deep in a ¾" dowel rod on your circular saw (Fig. B). Make it about 26" long. Clamp one end of the dowel in a vise; insert edge of bottom panel as shown, roll sheet around dowel. Bend the sharp angle over edge of 2 x 4 block of wood. Roll and bend four sides (Figs. C & D).

3 To make roof, bend narrow flanges downward by hammering over workbench edge to form edge seam; then using the slotted dowel, roll edges as in Step 2 to form gutters. Form ridge (Fig. E).

4 Next cut hopper ends and wooden part of base to shape (Figs. F & G). Clamp the four hopper ends together and drill for ⅛" x 18" dowels. Cut ⅛" deep slots in hopper ends for glass sides. A normal saw cut will be good for single weight glass. Brad a ¼" x ¼" strip of redwood to each hopper end as a stop for the glass to allow seed opening as shown in Fig. G.

5 Round off ends of the 18" dowels and insert in hopper ends before nailing them to a wooden base. Check glass and slots for proper spacing between ends. Nail the four hopper ends to bottom with 6d common nails. Be very careful to see that nails do not enter glass slots (Fig. K).

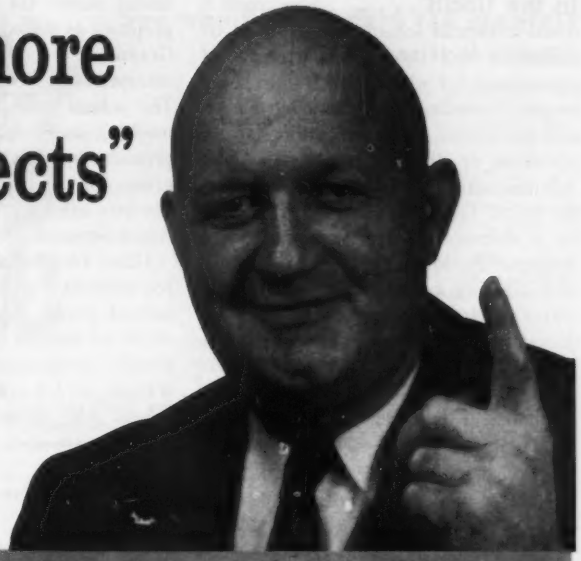
6 Cut glass to fit slots 5" x 5⅞" and sand sha edges. After glass is installed, secure the ⅛" per dowels with a 4d finishing nail as shown.

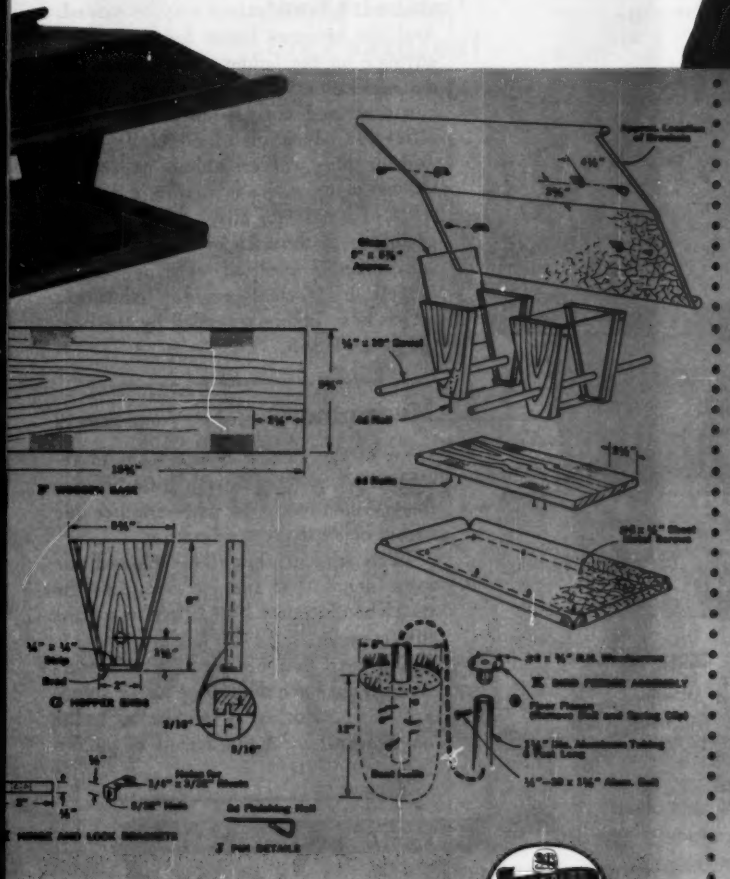
7 To varnish redwood, remove glass. Wh varnish is dry attach aluminum bottom to redwo with eight sheet metal screws. Drill pilot hole wood to prevent twisting off screws.

8 Make four roof brackets from sheet—two f hinges, two for locking brackets. Locate hin brackets and rivet to roof. Fasten roof to hoppe with screws, avoiding glass slots. Fasten bracke to close lid and position lock brackets. Remo and rivet brackets to roof (Figs. H & K).

nakes the student more
nd useful shop projects"

says John Meador,
Industrial Arts Department,
Board of Education,
Louisville, Kentucky





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Close lid, locate a point for the ¼" hole for eking pin. Drill a hole 1" deep in redwood. Form eking pin from 8d finishing nails (Fig. J). These ns will prevent wind from lifting the roof.

Remove bolt and spring clip from floor flange d fit flange into end of tubing. Drill ¼" hole rough tubing and flange for ¼" x 1½" alumim bolt. This allows feeder to be removed cleaning. Attach flange to base of feeder and bing to flange. Drill holes in the bottom of the t into which nails or wire can be inserted ig. K). Dig a shallow hole in the ground, insert post and fill the hole with concrete. The bird der is then ready for hungry birds.

Reynolds Do-It-Yourself Aluminum
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In the USSR . . . . *from page 8*

tional-industrial schools are operated by industries and by the departments of government for whom workers are being trained, including manufacturing plants, and the power, communications, transportation, or other ministries. The Chief Administration of Labor Reserves under the USSR Council of Ministers, created by a decree of the Presidium of the Supreme Soviet in 1940, was charged with training and distributing labor reserves throughout the country. This administration conducts vocational programs in labor-reserves schools. There are several types of these. Some are for graduates of the seven-year school. They attend classes for two years to become prepared as skilled workers for industry. Graduates are obliged to work at state enterprises for a period of four years. The school curriculum, textbooks, and teaching methods, for which uniform procedures have been designed, and programs for the preparation of vocational teachers are all prescribed by the Chief Administration of Labor Reserves.

Other vocational schools are operated for students who have not completed the seventh grade. These programs last from six to ten months to prepare workers for simple occupations. Some vocational schools are for graduates of the ten-year school who attend for periods of ten months to two years, depending on the complexity of the occupation being taught. For some other occupations, training programs are conducted by the employing industry. These are for jobs for which three to six months' training is sufficient. Students are usually adults who have no specialized skills.

As a delegation, we were impressed by the tremendous enthusiasm for learning and reading by all the Soviet people. There seems to be a great premium attached to obtaining as much education as possible. Each person is encouraged to advance by education and training to the level of his greatest usefulness to the state. There are very definite rewards for educational achievement. A better job may result. Greater social status is attained. A better salary may be earned. And life becomes better for those who advance on the ladder of responsibility and service to the government. Extensive part-time and correspondence opportunities for education of all kinds exist, and for those who are able to master the subject matter there is no terminal point in the formal educative process. Much of this is in the area of industrial education and almost all of it is accompanied by formal general education which is so highly regarded by the people of the USSR. ★

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Measuring . . . . *from page 9*

front of the class and will want to require each student to return the one he has finished before he takes another one to his bench for consideration.

Each student should be allowed the same amount of time to complete the test. Then be sure to take time to correct the tests.

I believe that industrial-arts instructors should have definite goals or standards for measuring. A test similar to the one shown here is one means of obtaining those goals. ★

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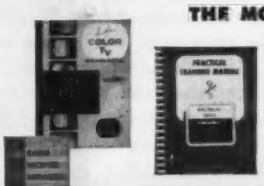

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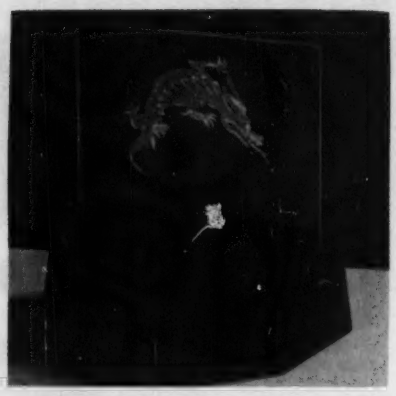
Scared of the dark?

Plastic Night Lamp

By Bob Reeves

Chula Vista, California, Junior-High School



IF you are looking for a project in plastic which will provide your students with many different experiences in working with the material, try this night lamp.

The picture panel, which is lighted from below, will show your students how uniquely light travels unseen through clear plastic until it strikes a roughened area on the surface. The carved design will provide an experience which can be made simple or complex as the ability of the student dictates. There will also be gained experience in the basic sawing, sanding, buffing, and cementing operations.

In cutting out the various pieces necessary for the base of the lamp, be sure they are rough cut *outside* the line, so later they can be sanded to the exact size. Care must be exercised to get all the pieces accurately shaped so they will fit together in a light-tight manner. I would suggest sanding the two ends and the similarly shaped middle piece at the same time to achieve a better fit.

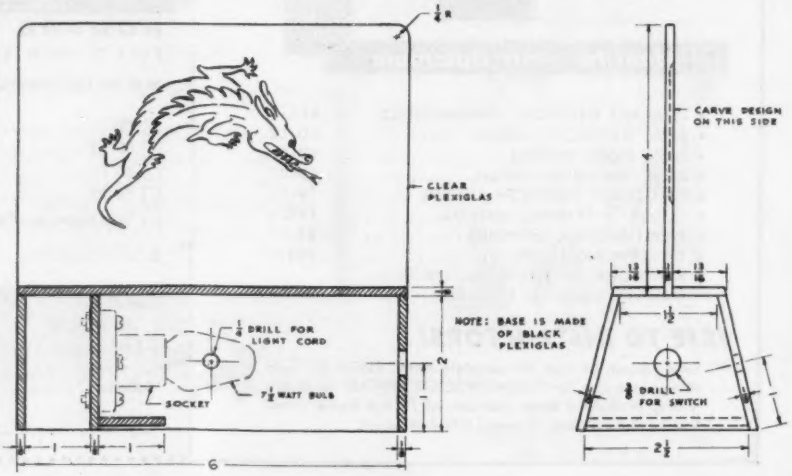
After the holes are drilled in the base pieces, the socket can be attached to the middle piece by two machine screws. Then all edges which will be exposed should be buffed until they have the same high gloss as the original surface of the plastic.

Assemble the ends and sides of the base first. Then cement in the middle piece with the attached socket. Before cementing in the 1″ strip which serves as a protection against the exposed connections, attach the switch and wire completely. When the two top pieces are cemented in place, allow the exact amount of space necessary for adding the picture panel when it is completed.

The edges of the picture panel must be properly finished after it is cut to size. This means that the bottom edge should be highly polished to admit the light from the bulb. The top and side edges should be sanded with a medium grit sandpaper to form surfaces which will be lighted later on.

The design in the picture panel can be cut in several ways. It can be carved using a ball-shaped cutting tip in a hand grinder. It can also be cut with a small hand router. Or you might have a student try sandpapering a design on the back surface while using a metal template to protect the areas to be left smooth. When the design has been completed, the picture panel is cemented in place.

Be prepared for expressions of delight when your student turns on the light for the first time and his design mysteriously comes alight. ★



IN THE *Morning Mail..*

[Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Michigan.

Dear Sir:

I would like to express my appreciation for T. Edison Bullard's article in the February, 1958, issue of SCHOOL SHOP, entitled "Hexagon-Shaped Tables." I have written to Mr. Bullard telling him of my appreciation. A copy of this letter is enclosed:

Dear Mr. Bullard:

The table which you designed seemed to present a desirable solution to a space problem existing in my general, metals shop. The enclosed photograph will show the adaptation of this table to our special needs.

You will notice that the table is somewhat smaller than yours, being a 4' diameter instead of the 6' diameter that you used. The top is made of ½" plate, rather than the wood which you used. The use of these tables has given us approximately 100 square feet additional floor space for use in another area. . . .

Glenn S. Crisp,
David Douglas High School,
Portland 16, Oregon

Dear Sir:

While conversing with a math instructor, I was hit squarely in the face with the comment, "He just does not have the ability to do math. He should be placed where he could do something with his hands."

This comment stung for I felt that I must have fallen down on the job of good public relations among the faculty as to the aims of my department. How many of us are faced with administrators and fellow teachers who look at our program as a good place to put the student who does not fit in smoothly elsewhere? Perhaps we should feel happy that at times we can take the slower student and make him a part of our program when others have failed. But we, too, must face the fact that when we become the "dumping ground" we have failed to impress the administrators, public, and fellow teachers with what we are trying to do and how we are trying to do it.

Perhaps if the math teacher to whom I was speaking knew some of the course content in her own field that is used by the industrial-arts students such as fractions, decimals, equations, and a host of other mathematical topics accepted as commonplace in our shops and drawings rooms, she would better understand that here indeed is the proving ground for much of the work she is spending her time, training, and effort in teaching.

Many of us fail in this all-important aspect of education because we could benefit by each others work but do not take advantage of it. What better teamwork and correlation could be asked than to have the science department teach the theory of radio or the magnetic properties of the electric motor and then have the industrial-arts students come with their newly acquired knowledge to our department, draw up the plans, and make a crystal radio or a small motor? The benefit from developing interest is rewarding enough but at the same time we would be letting the science department know that "those fellows in the industrial-arts department require a little more than hand-eye coordination." This is just one example of what might be done with other departments as well. . . . Such activity would make "dumping ground" a thing of the past.

Robert G. Hodinko,
Jefferson School,
Alexandria, Va.

JIGSAW JONES
A YEAR'S SUPPLY-ALL PRINTED UPSIDE DOWN!
THAT'S A GOOD ONE ON ME, HUH?
I THOUGHT IT WAS STRANGE THAT THE FLAPS HAD BEEN MADE ON THE BOTTOM..
Aaron Adams

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It's easier to teach good workmanship with the best tools. That's why so many school shops use Millers Falls bit braces, the world's largest selling quality line. There's a model in every price range, and these fine tools are built to take rough shop use. They're precision designed — built for accuracy, smooth operation and long life. For economy as well as performance, *you can't beat Millers Falls bit braces!*

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Boxed ratchet mechanism. Barber chuck. Self-opening jaws. Steel-mounted hardwood head with ball bearing action.

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Projects should mean more than "busy work"

Restating the Concept of Projects

By H. J. Kauffman

State Teachers College, Millersville, Pennsylvania

THE project, like many facets of contemporary education, has been on the receiving end of much criticism in recent years. In many of these instances of criticism I feel that the concept of the project as a learning tool in problem solving has been misinterpreted, that the real purpose of projects has been misjudged. The butt, therefore, of this criticism should not be use of projects as learning tools in problem solving but rather the corruption of the concept of projects to mean an easy "out" for a shop teacher to merely keep his students busy. In other words, projects-for-the-sake-of-projects shop teaching should rightfully be the scapegoat.

It follows then that a dislike for the kind of projects that minimize problem solving by the students, reducing his learning potential in industrial-arts courses, is justifiable. Unfortunately, the heavily loaded project racks in the nation's school shops tend to substantiate this criticism. In far too many instances the racks are filled with projects that have contributed mainly to muscle building.

In too many instances, too, unimaginative teachers have simply handed a student a blueprint or textbook and signalled him to "go ahead" and build something. It appears that many teachers still feel projects-for-the-sake-of projects is sound teaching. What happens as a result is that with this sort of indiscriminate assignment of "busy work" the project and the student are often not suited to each other. Consequently, the real benefits of learning by making projects is missed.

The scale appearing in a box on this page suggests learning values that are inherent in the procedures that are common to many different projects. The scale attempts to suggest which type of student would benefit most from specific procedures in various kinds of projects. The implementation of this scale calls for tact, knowledge, and wisdom. Constant effort in this direction, though, will place the project in its true and intended position in contemporary education as a useful learning tool. ★

Type of Project	Learning Involved	Acceptability
Project made and assembled by manufacturer and needing only superficial finishing by student.	Learning is held to a minimum.	Only for extremely dull students.
Project parts made by manufacturer or teacher and assembled and finished by the student.	Some problem solving but the most important has been done. A low degree of satisfaction may result.	Not desirable, but occasionally justified when shop facilities are limited.
Student copies plan for project from book or job sheet without any personal adaptation.	Little problem solving; mostly organization procedures.	Not desirable but useful for unimaginative students.
Student studies a variety of plans and makes variations or combines ideas for personal need.	Considerable problem solving might be involved.	Acceptable procedure for many students.
Student studies standard plans and evolves a new design or function for an object. Uses reference books for study of design and materials.	An alert mind is needed for such activity. The result may lack some desirable qualities, but much learning has occurred.	Only a small percentage can profit by this approach.
Student has need which cannot easily be solved by standard references. He studies the pros and cons; investigates historical precedent in the problem; studies materials and designs; perhaps visits industry; finally, builds a masterpiece.	Only a few can operate on this level. Learning and gratification are at a maximum.	Very acceptable.

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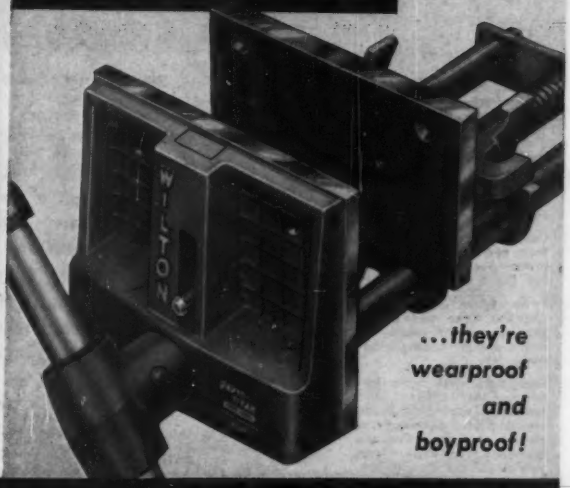

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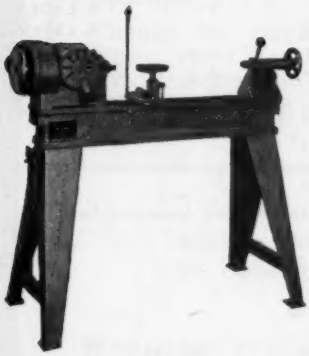

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2	Conveniently available from regular local distributors—no need to write for them and wait.	☐	☐
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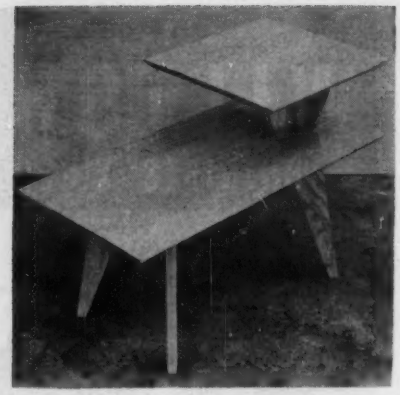
Modern End Table

By John W. Dawley

San Gabriel, California, High School



THIS modern end table, we have discovered, is a good project for students who have some experience with power woodworking machines. Since it does not involve very advanced machine woodworking processes, it can be utilized as a semi-advanced project.

The table, which is designed to fit into the decor of homes with modern furniture, presents a pleasing delicate appearance. It is best suited to the use of solid stock. Wood should be chosen to match the furnishings of the home.

The student will need to be able to glue stock edge to edge and square up the stock for the top and main shelf. Of course, the basic processes of planing, scraping, and smoothing stock with sandpaper are important here as in nearly all jobs where quality is the aim.

The cutting of the chamfer on the shelves may or may not be a new process. The 45° chamfer is cut on the circular saw with an auxiliary wood fence attached to the regular ripping fence. The saw is tilted to 45° and extended up into this stock. By adjusting the ripping fence position, the proper size chamfer will be cut.

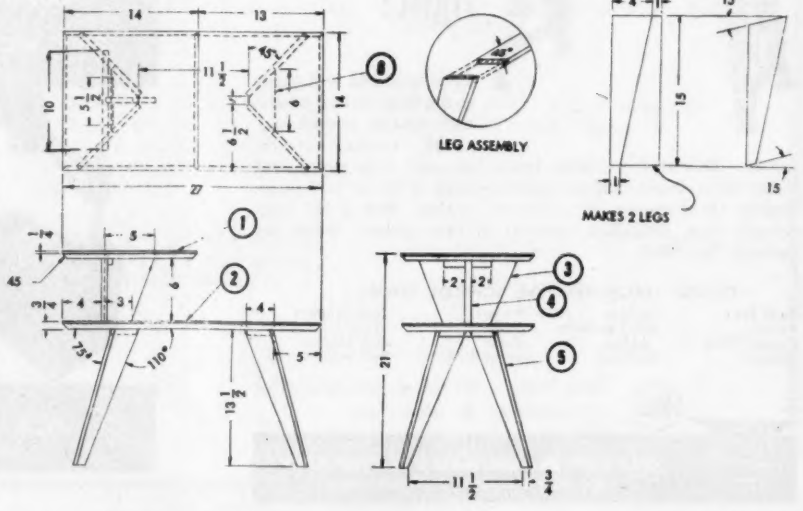
The 15° angles of the legs are cut on the circular saw with the straight edge of the leg against the miter gage.

The two pieces which support the top shelf are joined together by use of a dado joint. This should be cut before the pieces are cut on an angle.

The small cleats which hold the top shelf to the upright pieces are screwed into the top and into the back support piece. The legs are also attached to the braces by two screws.

The finish can be left up to the student, although we have had great success with using lacquer sanding sealer and lacquer. Final rubbing is with a No. 400 grit wet-or-dry paper, wet with benzine and then rubbed with lacquer rubbing compound. This is followed with an application of good quality paste wax. ★

Part	*Part No.*	*Size*
Top	1	¾ x 14 x 14
Main shelf	2	¾ x 14 x 27
Rear riser	3	¾ x 10 x 6
Front riser	4	¾ x 5 x 6
Legs (4)	5	¾ x 4 x 15
Leg braces (2)	6	¾ x 3 x 6



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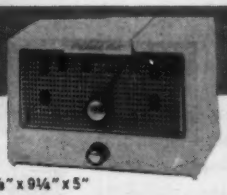

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The popular Packard-Bell 5R1 radio kit is perfect for student instruction in electronics. Powerful 5-tube superheterodyne circuit. Everything included... tubes, wiring, diagrams... beautiful white vinyl cabinet... complete parts layout... carefully prepared instruction sheets. Shipping weight 5 lbs. **$13.95***

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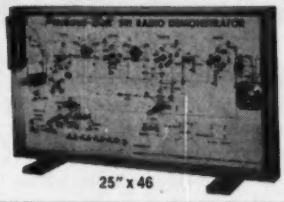
NEW! An all transistor, battery powered, superheterodyne receiver kit using sub-miniature components. In genuine leather case. 5 transistors plus a germanium diode. Ferroloop antenna. Complete parts layout, schematic, step by step instructions. Shipping weight 2 lbs. Battery, $1.50 extra. **$29.95***

5R1 DEMONSTRATOR BOARD

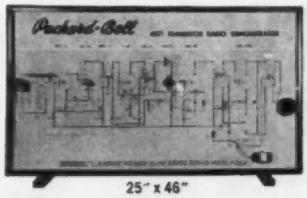
Ideal for audio/visual teaching. Schematic diagram mounted on ⅛" tempered masonite. 1" x 2" pine frame painted gunmetal finish. Board comes assembled with schematic mounted, frame screwed together and painted. Complete Packard-Bell 5R1 parts kit, hardware, instructions, and illustrations necessary for the completion and operation of unit included. Shipping wt. 17 lbs. **$34.95***



25" x 46

6RT1 DEMONSTRATOR BOARD

Like 5R1 Demonstrator board except using 6RT1 schematic and parts kit. Everything necessary for completion and operation of unit included. Shipping weight 19 lbs. Including battery..... **$49.95***



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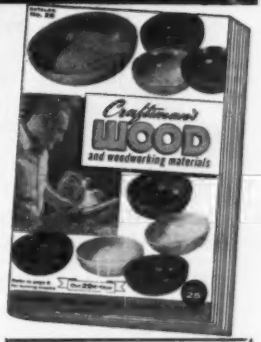

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KINKS

Payment will be made for each Kink published. Send to Editor, School Shop, Ann Arbor, Mich.

Three for One

Each Friday afternoon one of our students thins out the glue in the hot glue pot until it is approximately three-fourths as thick as that used for wood joints. The glue is then spread and rubbed on the surfaces of polishing wheels. The wet wheels are then rolled in an abrasive and left to dry.

We have found the "Scotsman's" abrasive, discarded emery particles used as sand blast for carving inscriptions in grave markers, still has enough marble in it to temper the cutting action of emery on the wheel and produce a good finish on metal.

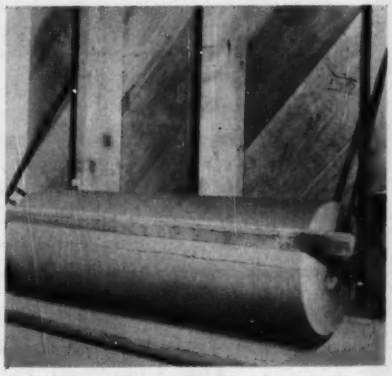
So there you have three operations in one: a commercial operation—building up a polishing wheel; cleaning out a glue pot; and maintaining polishing wheels with an abrasive that can be had for free.—*James E. Bowman, Central Michigan College, Mt. Pleasant.*

Splitting Tape Rolls

To cut 1" rolls of drafting tape into ½" widths, mount a holding block on a faceplate with a tapered plug to drive the roll on tightly. Then, with a coping saw, saw through the center of the tape with a sawing action while the lathe revolves the roll.

We were able to double our supply of army surplus tape in this way.—*Stan Schirmacher, Papago School, Phoenix, Arizona.*

Paper for Many Purposes



A large roll of wrapping paper is one of the most useful items in our shop. It comes in handy for making full-sized drawings and layouts, as protection for floors and bench tops when gluing and finishing, and its low cost makes it a good substitute for costly drawing paper when only rough sketches are needed for illustrative purposes.

We hung our roll out of the way on one of the walls where it is accessible. A light spring attached to each end of the cutoff bar keeps the roll from unwinding more than is needed at any given time. The hanger brackets are easily constructed from light-weight strap iron. Once you have started using

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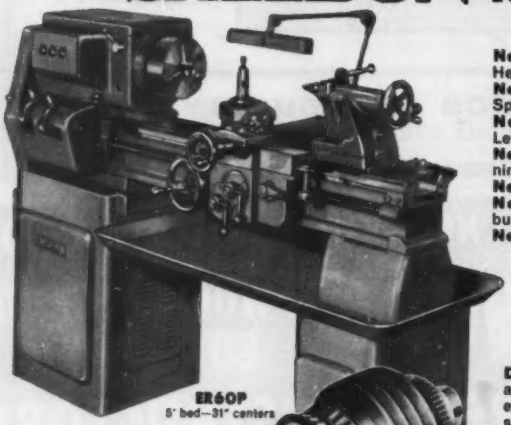

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Different. Cam-action tailstock clamp for rapid release and instant locking of tailstock.
Different. Triple, cogged, V-belt outboard drive—eliminates intermediate shafts—delivers more power to spindle.

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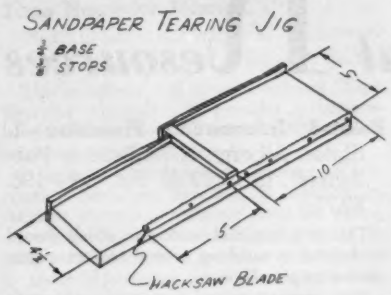
this kind of paper, you'll wonder how you managed without it.—*C. Wayne Close, Box 592, Glendale, Ore.*

Sandpaper Tearing Jig

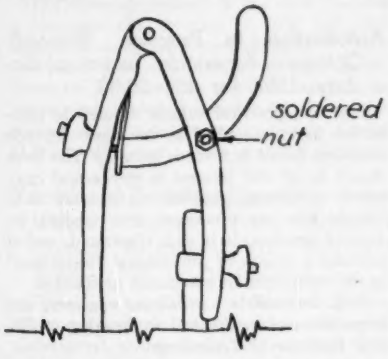


Cutting standard 9 x 10 sheets of sandpaper proved to be a time consuming project, especially when trying to supply 120 7th-graders. Also was unsuccessful having pupils rip the paper into quarters themselves.

The illustrated jig has solved this problem. The base board was made long enough so that one end could be clamped to the bench top for firm support. The 5″ section is used to cut the 10″ length of the paper in half. The 4½″ section is used to cut the 9″ width of the paper in half. The hacksaw blade (two sections), screwed at intervals to the base, aids in tearing a neat edge on the paper. It will cut two sheets at a time very satisfactorily.

The simplicity, easy construction, and easy operation of this device make it a valuable aid.—*Gene Troydoff, Elm Street School, Westfield, N.J.*

Compass Repair



The material where the thumb screw which locks the quadrant on compasses and dividers is often too thin for retapping when the threads in the hole become worn or stripped. These tools can be easily restored by soldering—hard or softer solder will do—an 8-32 hex nut on the side of the tools as shown and using a new thumb screw of the correct thread. This same idea can also be used on new compasses to greatly extend their wear at that point.—*Worsley Fardy, Maynard, Mass., High School.*

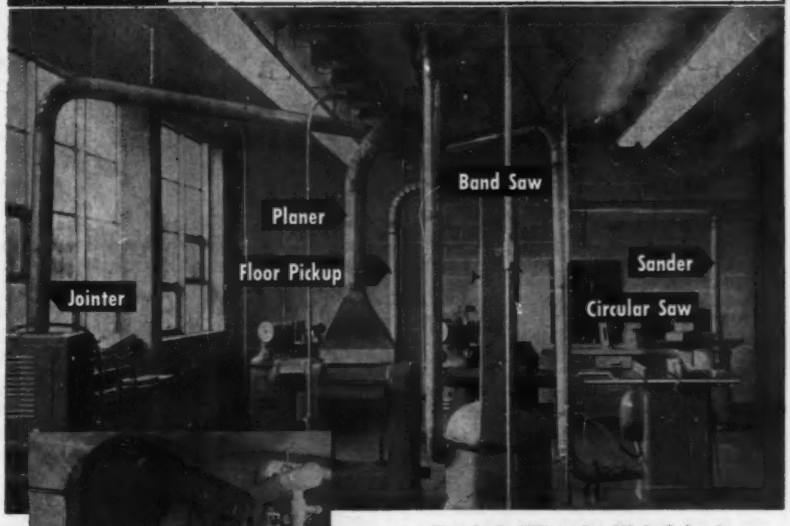
Paper Economy

To conserve tracing paper and tracing cloth, order your roll supplies in such sizes that it can be cut in lengths an inch or two longer than the sheets generally used by students. Either a band saw or fine tooth hack saw does a neat job. The boys in your shops can then cut whatever size sheet they need with little difficulty and little waste.—*Joseph F. Ruffino, Benjamin Franklin High School, Rochester, N.Y.*

A Nail Bender by Bender

No doubt you have tried to extract bent nails from lumber only to be frustrated by the bent part of the side opposite from which you are tugging. To get around this source of irritation, take a piece of mild steel and drill a hole in one end slightly larger than the nails or spikes you'll be trying to extract. Work the pointed end of the bent nail in the nail bender, straighten the bent nail, and give it a few whacks with your hammer, enough to push the head out far enough to grip it firmly in the claw of a claw hammer.—*William Bender, Parrish Junior-High School, Salem, Ore.*

OBP ENGINEERED DUST CONTROL SYSTEMS FOR SCHOOL SHOPS



This combination filter-collector is located in the storage room, completely isolated from the working area of the shop. The use of filter bags in this collector permits all heat to be retained in the building.

Frank J. Wiley Jr. High School, Cleveland Heights, Ohio

"A dust collection system is a 'must' in a modern shop. It results in safety for the operator around the machine, provides clean air to breathe, and keeps the floor free of slippery chips and dust."—Mr. James F. Nemastil, Chairman, Junior High Industrial Arts, Cleveland Heights, Ohio.

For over 30 years, Ohio Blow Pipe has engineered, manufactured and installed dust collecting systems for industry and school shops.

Before you build a new shop, let Ohio Blow show you the latest engineering advances in modern, custom designed integrated systems—or if you plan to modernize or expand your present shop, ask an Ohio Blow Pipe Engineer to survey your dust collection requirements and give you a cost estimate.

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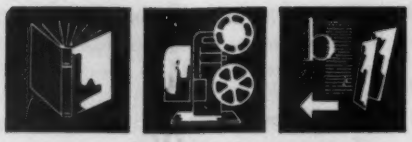

instructional Resources

Books:

Woods and Woodworking for Industrial Arts. Olson. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1958. Pp. xi+235. $4.00.

Consideration is given in this book to woods and woodworking from a modern industrial point of view. It contains information on all aspects of the wood industry as well as on related technology, such as finishing and upholstering. In addition it provides data on consumer guidance and occupational opportunities in the field of woodworking.

Delmar W. Olson is professor of industrial arts, Kent State University, Ohio.

The Accreditation of Industrial Arts Teacher Education. Fryklund and Helton. Bloomington, Ill.: McKnight & McKnight Publishing Co., 1958. Pp. xi+111. $4.00.

This is the seventh Yearbook of the American Council on Industrial Arts Teacher Education. It is a condensed report of a seven-year study relating to this area of education. The evaluation instruments presented in it are intended to be used for departmental self-evaluation. It is the hope of the authors that departmental personnel will study their programs, and use this book as an aid in improving them.

Verne C. Fryklund is president, Stout State College, Menomonie, Wis. H. L. Helton is a member of the faculty at Northeastern State College, Tahlequah, Okla.

Leathercraft. Groneman. Peoria, Ill.: Chas. A. Bennett Co., Inc., 1958. Pp. 158. $3.68.

In this book special attention is given to the essential details of leathercraft needed by the beginner who wishes to produce attractive work. The processes included are presented in their natural sequence, each important detail being clearly illustrated.

The major sections include basic information relative to types of leather, tools, and equipment. A list of suggested projects is provided.

Chris H. Groneman is head of the industrial-education department at Texas A & M College.

Introduction to Mechanical Drawing. Harman. Boston: Allyn & Bacon, Inc., 1958. Pp. viii+79.

This is a text which has been prepared specifically for pupils who are entering shop classes for the first time.

The material is presented in a format in which the text is supplemented by numerous illustrations.

Earl H. Harman is an instructor in the Battle Ground, Washington, Junior-High School.

Related Information—Plumbing—1. Slater. Albany, N.Y.: Delmar Publishers, Inc., 1958. Pp. vii+198. $2.75.

This is a text and workbook which should be helpful in teaching related subject matter needed by plumbers.

Both apprentices and journeymen will profit from having a copy. Even the layman, who is building a house or who has a desire to know how plumbing fixtures work, can learn much from it.

Teachers of apprentice classes or trade extension classes will find it an excellent teaching aid.

Closed Circuit TV System Planning. Mayer and Chipp. New York: John F. Rider Publisher, Inc., 1957. Pp. xii+250. $10.00.

This is a complete and authoritative source of information for all who are contemplating the use of closed-circuit television. It answers all questions relative to the organization of closed-circuit television systems.

The book is divided into three sections—the application of closed-circuit television, how it works, and the equipment needed to make it work.

A large number of illustrations are included to supplement the text. It will form an excellent addition to the library of anyone who is interested in this application of television.

Morris A. Mayer is closed-circuit TV manager at Visual Electronics Corp. Rodney D. Chipp is a licensed professional engineer and a Fellow of the Institute of Radio Engineers.

Automation in Practice. Rusinoff. Chicago: American Technical Society, 1957. Pp. 261. $6.50.

This is a practical volume devoted to automation as it is applied to the many intricate processes found in modern industry. The book should be of vital interest to mechanical engineers, tradesmen, and the many other individuals who are concerned with modern industrial practice. It is well illustrated, and it contains a wealth of professional "know-how" in the techniques of automated production.

S. E. Rusinoff is a practicing engineer, and is professor of mechanical engineering at Illinois Institute of Technology.

Printing and the Allied Trades. Karch. Fourth Edition. New York: Pitman Publishing Corp., 1958. Pp. xvi+318. $3.80.

This text has been designed specifically for use in schools. It is suitable for beginning pupils, whether they be in grade school or in vocational classes for apprentices. The material covered ranges from simple composition to lithography and engraving. At the end of each chapter there is a list of questions for discussion. One section is devoted

to lists of projects, and another section includes a number of suggested objective tests.

R. Randolph Karch is coordinator of publications and printing in the State Department of Public Instruction, Harrisburg, Pa.

Tape Recorder Manual. (Vol. 1.) Indianapolis: Howard W. Sams & Co., Inc., 1958. Pp. viii+137. $2.95.

This is volume I of a series entitled "Tape Recorder Manuals." It provides a comprehensive coverage of 1956 and 1957 models produced during that period.

It contains exploded views showing all mechanical parts and how they fit together. In addition there is a complete parts list and a schematic diagram of the electric wiring in each unit. Instructions are given also on how to make adjustments when they are needed.

Motor Service's Automotive Encyclopedia. (Third Edition.) Edited by Purvis and Toboldt. Chicago: Goodheart-Willcox Co., Inc., 1958. Pp. 757. $7.95.

This is a revised edition of a book which is a comprehensive encyclopedia of information about automobiles. It is a complete library on the subject in one volume.

With this book as a guide, the mechanic should be able to service any model of an American car manufactured during the past 25 years. He should be able to perform a similar service on the more popular foreign cars, since considerable space is devoted to information concerning them.

While it is intended for use by the automechanic, it should be equally valuable in schools and colleges where instruction is being given in the area of automotive engineering.

Jud Purvis and Wm. K. Toboldt are editors of *Motor Service Magazine*.

Automatic Record Changer Service Manual. (Vol. 10.) Indianapolis: Howard W. Sams & Co., Inc., 1958. Pp. xiv+117. $2.95.

The material included in this book provides a comprehensive coverage of 1956 and 1957 models of automatic record changers.

What is presented here, along with the information contained in previous manuals on the subject, makes it possible for the service technician to maintain an up-to-date library of information on all types of record changers.

Vocational Training Directory of the United States. (Third Edition.) Cohen. Arlington, Va.: Potomac Press, 1958. Pp. vi+228. $2.95.

This is a compilation of over 7000 private and public schools offering almost 700 semi-professional, technical, and trade courses. Considerable information is given about each, including tuition charges, and approval status.

Problems in Teaching Industrial Arts and Vocational Education. Jones. Milwaukee: Bruce Publishing Co., 1958. Pp. x +213. $2.50.

This book deals with common problems encountered by most teachers in their regular class work. It contains a collection of problems which were selected on the basis of a survey made for the purpose of isolating those that are considered to be of major importance.

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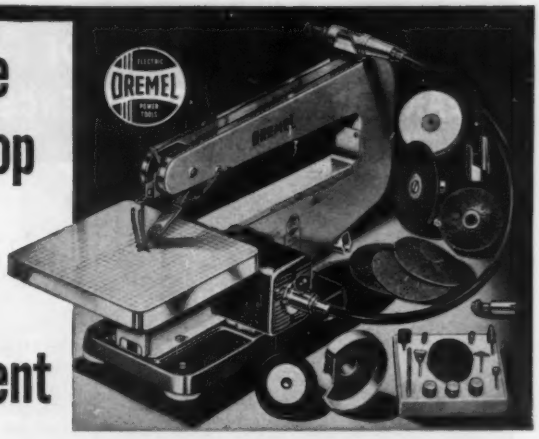

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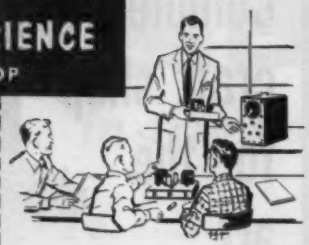

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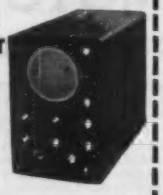

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Walter B. Jones is the field of vocational-teacher education at the University of Pennsylvania.

Pamphlets:

Drawing for Good Reproduction is a 32-page manual written by Arthur H. Rau and designed for use in mechanical drawing classes and reproduction departments. Numerous illustrations show drafting techniques and kinds and uses of drawing materials. Available for $1 from the National Association of Blueprint and Diazotype Coaters, 1001 Connecticut Ave., N.W., Washington 6, D. C.

Ceramic Decoration by Lois Culver Long is a 60-page book covering virtually all major decorating techniques. Specific information is given on the subject and numerous illustrations of outstanding pieces are reproduced. Available for $1 from American Art Clay Co., 4717 West 16th St., Indianapolis 24, Ind.

Automobiles Facts and Figures is an 80-page, two-colored statistical report on the automotive industry. This is the 37th edition of this report. It deals with everything from sales to products that go into making cars. For your copy write to the Automobile Manufacturers Association, New Center Bldg., Detroit 2, Mich.

Audio Visuals:

Boring Tools for Woodworking is a b & w, 35mm filmstrip series that illustrates the different types and uses of boring tools such as hand drills, bit braces, bits for power tools, etc. There are nine strips in the series: Types of Boring Tools; Holding and Boring Tools and Accessories; How to Bore Tools; How to Use the Doweling Jig; How to Use Expansive Bits, Forstner Bits, and Brad Awls; How to Use Hand and Breast Drills; How to Use Automatic Push Drills and Spiral Ratchet Drivers to Bore Holes; Boring Tools for Use in Electric Drills; and How to Sharpen Boring Tools. The cost of the entire set is $5 shipped anywhere in the U.S. Write to Stanley Tools, Educational Dept., 111 Elm St., New Britain, Conn.

20,000 Volts under the Hood is a slide-sound, color film kit covering the ignition circuit. It consists of a 35mm color film, a 12" record, and a leader's guide containing suggested meeting procedures. Running time is 12 minutes. It shows with simplified illustrations the internal construction and operation of a battery, distributor, and ignition coil, and explains in nontechnical terms how these units work together. Cost of the kit is $6. A film booklet accompanies the kit and it contains the same illustrations as the film. The booklet is available free in limited quantities. Write to Technical Editor, Delco-Remy, General Motors Corp., Anderson, Ind.

Punch Press Guarding is a 11-minute, color movie depicting the important duties of the press set-up man. It shows many different types of presses, the set-ups required to provide safe guarding, and the adjustments that can be made. Prints of the film are available for $115 each by writing to International Film Bureau, Inc., 57 E. Jackson Blvd., Chicago 4, Ill. ★

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Project Design

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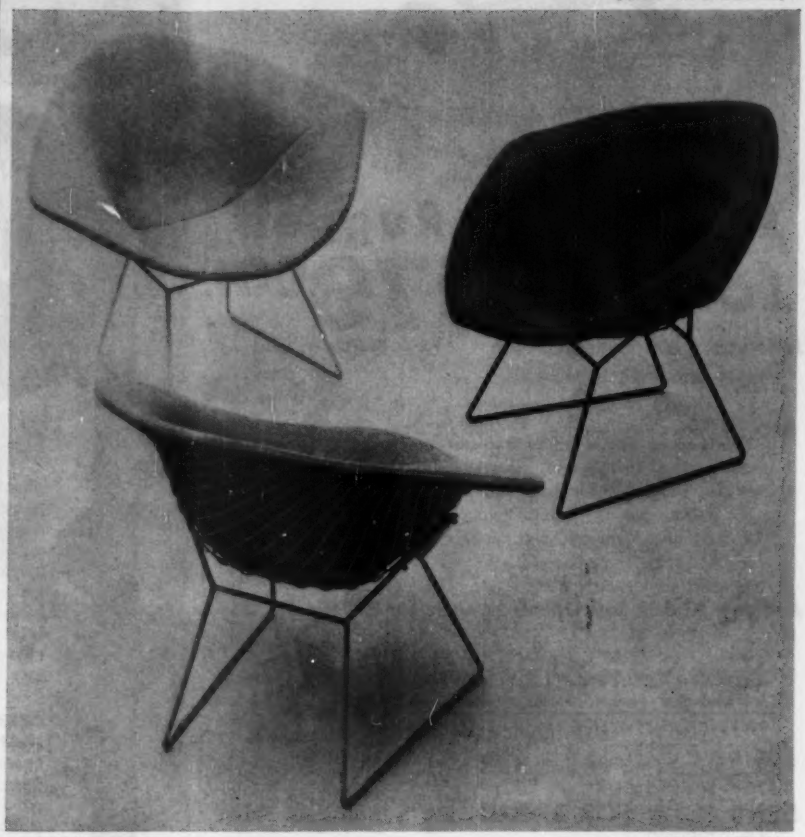

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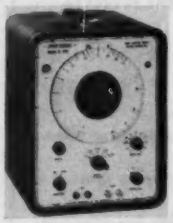
news from Industry

(Circle the numbers on the card in this issue to secure the items listed.)

New Precision Model Covers Complete Range



A Precision Model E-310 sine and square-wave generator, featuring both sine and square-wave output over the complete range of five cycles to 600 kilocycles, has been announced by Precision Apparatus Company, Inc.

The company states that distortion on Model E-210 is less than 1 percent at 10 v into 600 ohms. The model has a 6" diameter turning dial with 12:1 drive ratio to provide an effective scale length of 85" over the five bands.

The new model, which is 9" x 11½" x 15" in size, is light weight, and portable, the company states.

For more information write Precision Apparatus Company, Inc., 70-31 84th St., Glendale 27, Long Island, N.Y., mentioning SCHOOL SHOP; or *circle no. N-1 on the business-reply card.*

Pocket-Size Microscope Introduced for Measuring

Micro-Mike is a new 20-power pocket-size inspection and measuring microscope with a superimposed scale now being marketed by the DuMaurier Company.

The manufacturer states that an accurate four-lens optical system contained in a lightweight metal casing provides a flat, undistorted view which is larger and brighter than other instruments of this type. The superimposed scale, it asserts, has .002" graduations and is internal and cannot be scratched or smeared.

For more information write DuMaurier Company, Elmira, N.Y., mentioning SCHOOL SHOP; or *circle no. 12 on the business-reply card.*

Eagle Anvils Range From 50 to 700 Founds

Fisher & Norris announces it is making available to industrial-education shops its complete line of precision-made Eagle anvils.

Eagle anvils, the company alleges, have a horn of untempered forged steel in one solid piece, a face of solid crucible tool steel, and a body of solid gun-iron alloy which will produce satisfactory hammer rebound without unnecessary ringing. The anvils range from 50 to 700 pounds, with faces ranging from 10" to 25½" long, and horns from 6½" to 14½" in length. Special anvils also are available.

The company emphasizes that its anvils are made to last.

For more information write Fisher & Norris, Eagle Anvil Works, Bloomsbury St., Trenton, N.J., mentioning SCHOOL SHOP; or *circle no. N-3 on the business-reply card.*

Master Caliper Can Measure Hard-to-Reach Places

The new direct-reading caliper made by Master Specialty Co. is designed to measure anything up to 4" with the size being shown on a precisely calibrated scale.

Curved legs with narrow tips reach sections of odd-shaped parts that are inaccessible by other methods, the company states. The 0-4" scale is calibrated in inches and 32nd's. Squeezing the handle opens the caliper; a spring closes it. A thumb screw locks the pointer at any mid-scale position to permit using the caliper as a gage.

The caliper shown is for outside measuring. Another model with reversed tips is available for inside measuring.

For more information write Master Specialty Co., 3725 Monitor Ave., Minneapolis 26, Minn., mentioning SCHOOL SHOP; or *circle no. N-4 on the business-reply card.*

New Type Dispenser for Star Brand Band-Saw Blades

A new type dispenser for Star brand band-saw blades has been announced by Clemson Bros. Called Reel-Pac, the new product is a free running permanent reel of unbreakable materials.

The 9¼" diameter dispenser, the company states, holds 100' of blade without the usual container distortion caused by spring tension. The company alleges that the new Reel-Pac eliminates blade snarling, and is easy to store and to use—simply pull out the amount needed and cut.

Three blade types are available in the new dispenser in widths up to ½".

For more information write Clemson Bros.,

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The No. 52-52 Four - Student Woodworking Bench is 52" long, 52" deep and 31¼" high. The laminated edge grain maple top is 2¼" thick with end bolsters and four woodworkers' vises. Base consists of two pressed steel bench legs.

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The No. 65 - 50 - 402C Four - Student Woodworking Bench is 64" long, 50" deep and 33¼" high. The laminated edge grain maple top is 2¼" thick with end bolsters and four woodworkers' vises. Base consists of two steel cabinets back-to-back. Each cabinet is 36" wide, 21" deep and 31" high, each with an adjustable shelf.

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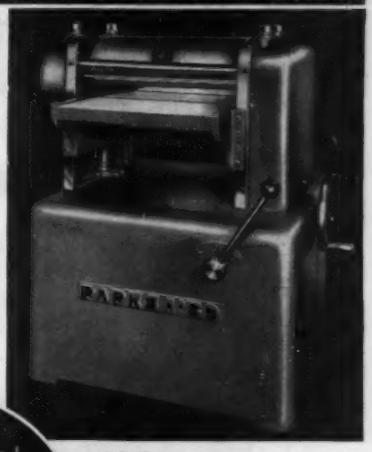

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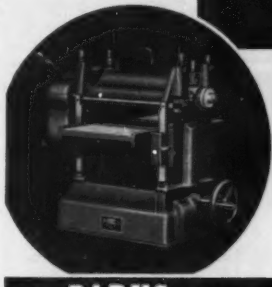

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PARKS NO. 95 — A compact, sturdy thickness planer that offers mill planer precision and ruggedness at a sensationally low price. Write for descriptive literature on both machines illustrated as well as on PARKS wood- and metal-cutting Band Saws, Radial Saws, Planer-Jointer Combination Machines.

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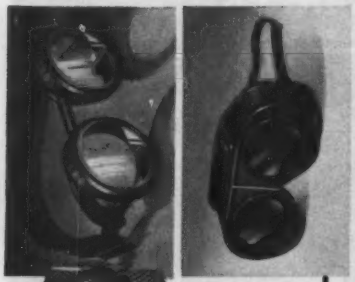

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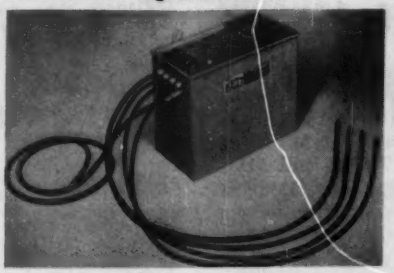
Inc., Middletown, N.Y., mentioning SCHOOL SHOP; or *circle no. N-5 on the business-reply card.*

Mist Coolant Generator Announced by Kett Tool



A new mist coolant generator for eliminating dry cutting methods at low cost is now being marketed by the Kett Tool Company.

The portable all-in-one unit is designed so mist can be applied directly onto the cutting edges of tools where it is most effective, the company states. When chips interfere, mist can be applied from underneath, it adds.

No special coolants are required for the new generator, the manufacturer points out, and, since its power source is an air line with no pressure in the container, it is safe to use. With the new mist process, the coolant dissipates in the air, the manufacturer declares, and there is no need for coolant pans or splash guards.

For more information write Kett Tool Company, 5055 Madison Road, Cincinnati 27, Ohio, mentioning SCHOOL SHOP; or *circle no. N-6 on the business-reply card.*

Power-Tool Table Introduced by Phillips and Buttorff

A tripod power-tool table is now being marketed by Phillips and Buttorff Corp.

The table, which has a 12" x 12" slotted top with a 360° rotation and a height adjustment of 33¾" to 40", is a design used in the shops of the manufacturer for several years and found very useful for holding such small power tools as grinding wheels, vises, drill presses, and jig saws. The table is made of hi-tensile cast iron, the company says, and occupies less than two square feet of floor space.

For more information write Phillips and Buttorff Corp., 811 12th Ave. N., Nashville, Tenn., mentioning SCHOOL SHOP; or *circle no. N-7 on the business-reply card.*

Millers Falls Driver-Drill Is New Two-Way Power Tool

The Driver-Drill, a new two-way power tool introduced by Millers Falls, combines the features of a high-torque position drive screwdriver and a rugged ⅜" drill in the same unit.

The manufacturer asserts that this new tool, which it claims is the first of its kind, spans the complete range of driving jobs, from heavy production work to delicate precision fastenings, and it can also be used to drill holes in wood or steel. This means, it states, that the

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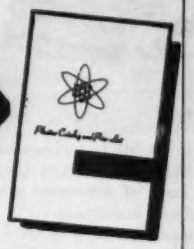

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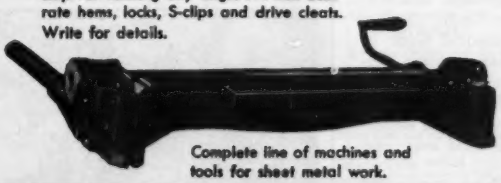

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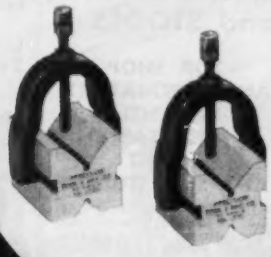

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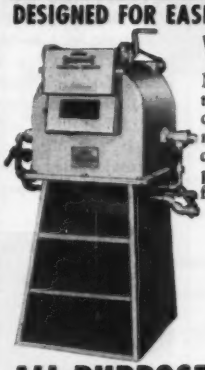

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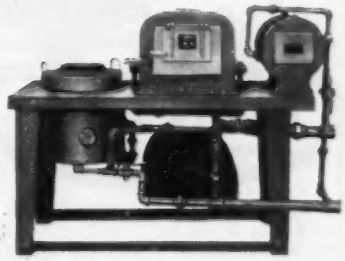

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operator can first drill pilot holes and then drive screws without need for another tool.

The Driver-Drill is available in two models: No. 2660 with saw grip, and No. 2860 with pistol grip.

For more information write Millers Falls Company, Greenfield, Mass., mentioning SCHOOL SHOP; or *circle no. N-8 on the business-reply card.*

L. S. Starrett Markets Two New Tool Chests

A line of professional quality tool chests has been announced by The L. S. Starrett Company. The chests are made of reinforced steel or hand-rubbed Honduras mahogany.

The company announces that both chests are available without tools or with three different assortments of Starrett tools selected to provide basic as well as more advanced precision measuring equipment.

The metal chest, which weighs 28 pounds, measures 20" x 8½" x 13¾" with a 19½" x 7¾" x 3¼" top compartment. The wood chest measures 20" x 9½" x 13" with a 19" x 8¼" x 2⅞" top compartment and weighs 19 pounds. The metal chest has seven drawers and the wood chest has nine.

For more information write The L. S. Starrett Company, Athol, Mass., mentioning SCHOOL SHOP; or *circle no. N-9 on the business-reply card.*

Erec-Tronic System Features Use of Jiffy-clips

The use of a so-called "Jiffy-clip" in building circuits using the Erec-Tronic System means faster and more economical work in school electronic shops, the manufacturer, Science Electronics, Inc., maintains.

The "Jiffy-clip", an invention of a former electronics teacher, eliminates tools and soldering and permits parts to be used over and over again.

The company recently held a demonstration to show the difference between building a circuit by traditional means and by the Erec-Tronic system at the annual summer conference for directors and teachers of vocational and trade schools at State Teachers College, Fitchburg, Mass. Two students were given the same circuit to build—an audio amplifier with power supply—using RETMA (now EIA)

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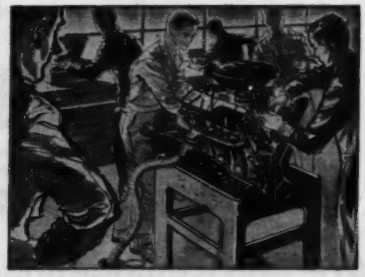

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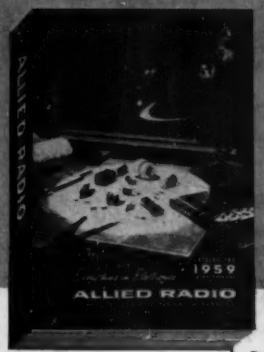

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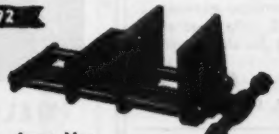

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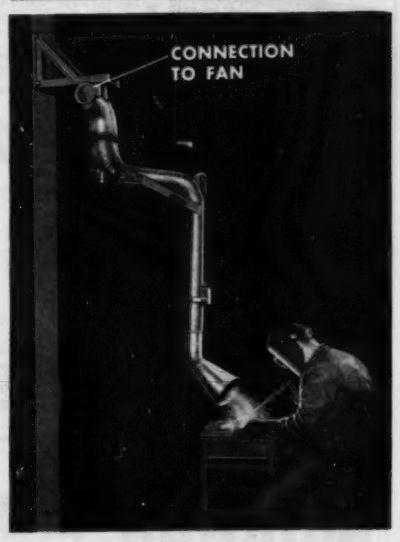

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Electronic Test Equipment is the title of a new 12-page, two-color catalog of test equipment for schools and industry published by Kingston Electronic Corporation. The company states it is the first catalog to describe in detail the equipment incorporating the much discussed electrostatic pick-up for wave form analysis of electronic circuits having periodic wave forms between 3 mc and 240 mc. For a copy write to the company, Medfield, Mass., mentioning SCHOOL SHOP; or *circle no. N-13 on the business-reply card.*

Serving School Shops is the title of the Gould Industrial Supply Company's 1958-59 catalog. This 128-page catalog lists, among other items, general tools and supplies, drafting supplies, metalworking equipment and supplies, shop benches, and welding equipment. For a copy write Gould Industrial Supply Co., 17 Moore St., Leominster, Mass., mentioning SCHOOL SHOP; or *circle no. N-14 on the business-reply card.*

The Adjusto-Quick drill press vise is one of the new products featured in a new catalog of metalworking tools issued by L-W Chuck Company. The catalog also includes information on lathe chucks; dividing heads; milling-machine vises; and magnetic chuck demagnetizers, and rectifiers. For a copy write L-W Chuck Co., 69 S. St. Clair St., Toledo 4, Ohio, mentioning SCHOOL SHOP; *or circle no. N-15 on the business-reply card.*

Washington . . . *from page 56*

science, math, and foreign languages shall be carried on in accordance with a state plan—thus, once more, state officials will be impelled to give greater recognition to these subjects. To mention still a third opportunity for greater service on the part of state departments of education—school statistics should, with the benefit of federal dollars, become more reliable, should become available sooner, and should be more widely disseminated than ever before.

Thus, the new education act will send out its impulses throughout America's educational systems — touching the junior-high-school classroom with the same impact as the graduate-study seminar.

Business *Not* As Usual.—We now come to Title VIII of the new law, which, the Office of Education says, does not mean business as usual for vocational education. Title VIII wraps up two concepts, one of which, at the present time at least, is in danger of being overlooked. The two ideas are (1) creating more opportunities for training technicians

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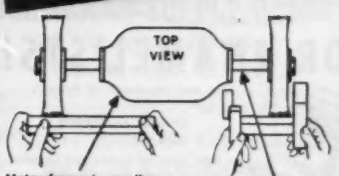

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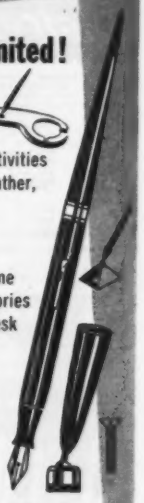

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and skilled workers in defense, scientific, and technical fields; and (2) creating more centers which will accept candidates from larger geographical areas than the traditional school district.

Well, the area concept is, temporarily, at least, not getting too much attention in Washington. This month, anyway. The emphasis seems to be on deciding what it will require to increase training opportunities for technicians. This involves finding answers to at least three questions: what are the defense occupations; exactly what is a highly skilled technician; and what facilities and resources will be needed to train these critically-needed workers. It'll take weeks for the answers to come out. But at least one thing is certain now:

"Title VIII is not a wide open thing," said one vocational official. "In fact, it is pretty restricted and restricting."

The restrictions were written into the law by Sen. Bush (R., Conn.) who took the floor in the final hours of Congress to press through his limiting amendments. It is worth noting exactly what Sen. Bush said and what the intent of his amendment is.

"My amendment," said Mr. Bush, "would first limit to four years the authorizations for appropriations for the new area vocational educational programs. Second, it would provide that funds shall be used exclusively for the training of individuals designed to fit them . . . as highly skilled technicians or semiprofessional personnel in recognized occupations requiring scientific knowledge in fields related to national defense.

"It seems to me the program should have a limitation . . . the bill ought not to be vague . . . it should be pinpointed."

And pinpointed it is, to *skilled occupations* needed for *national defense.*

However, the new program is not pinpointed to the trade and industrial phase of vocational education. Indeed, federal officials see Title VIII as cutting across the interests of the entire U.S. Vocational Education Division. This, certainly, includes vocational agriculture, possibly home economics, conceivably distribu-

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tive education. That is one reason that the administration of Title VIII (which, incidentally, is also Title III of the George-Barden Act) has been lodged directly under James Pearson, assistant commissioner for vocational education, rather than within any one of the long-established branches of the Division. (It seems to be U. S. Office of Education policy to set up new units throughout the Office to administer all parts of the new act.) Dr. Pearson has enlisted the help of Dr. Lynn Emerson, a former Cornell University educator. It is to these two men, therefore, and whatever new unit will be created under them, that we must look for leadership in putting the new activity into effect.

Area Vocational Fund Requirements. —It is much too early to predict how Title VIII will work out in practice, but this much can be outlined:

1. Each state must amend its state vocational education plan to include a new part based on the new act.

2. Bulletin #1, as revised recently, applies to the new act—for the most part, that is.

3. The U. S. Commissioner of Education will announce the list of defense-related occupations for which the new funds can be used. But state and local authorities will prepare the sequence of courses.

4. Any new area vocational course must be approved by a committee consisting of at least one employe, one employer, and one educator—all very much involved in the occupation for which training is to be given.

5. Then, too, the course, to be approved, must include some mathematics, chemistry, physics, biology, or other physical and biological sciences as required by persons engaged in the work for which training is being given.

6. Only students who will profit by the training are to be accepted.

7. The act provides money to buy instructional equipment and supplies. However, title to equipment will remain with the state, on the theory that the state may want to move it from time to time to communities where it is most needed.

8. Matching? The act stipulates that the additional funds authorized are to be matched dollar for dollar. But we are also informed that no actual outlay of money by state and local authorities will be needed. Under the George-Barden Act, state and local people are already spending $4 (on a national average) for every federal $1 they receive. ★

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from Washington

by Michael Paca

Washington Trek.—The nation's chief state school officers traveled the road to Washington late last month for a three-day history-making meeting. They came to listen to an explanation of the National Defense Education Act of 1958. Chief explainer was U. S. Commissioner of Education Lawrence Derthick. It was no easy task for him. It's a big law, its ramifications are many, its implications far-reaching, and even grave.

To explain the last word, it should be said there are some who accept, in all honesty, the view that "this act constitutes a surrender to the trend toward centralized financing and direction of social progress through education." The words are those of the U. S. Chamber of Commerce—and the opposition deserves to be heard. The Chamber took advantage of the chief state school officers' conference—one of the few ever called by the U. S. Office of Education—to announce that "this act places decision-making about the emphases and methods needed in American education at the federal level."

While the Indiana state chief school officer was sympathetic, the rest of the state superintendents were more concerned with the explanation of what the law can mean to them, and to the administrators, teachers, and pupils in the schools and colleges within their state boundaries.

A Financial Nudge.—One way to gage the meaning of the law is to say that it could have a powerful impact on the curriculum, on guidance, on testing, on methods of teaching through audio-visual aids, on the mustering of student brain-power, on the future supply of college graduates, future teachers, future technicians, on the quality of educational statistics, and on the spread of scientific knowledge.

Another way to gage its meaning is to say that schools which now teach science as memory work should be able to turn to the laboratory and problem-solving methods. Schools which lack skilled guidance workers should be able to get them. Schools which never had a testing program should be helped to launch one. Schools which haven't been able to offer modern languages should be able to offer them.

Still another way to gage the act's meaning is perceive that the federal government is nudging local administrators to send their instructional staff members to institutes for in-service training in modern language instruction and in guidance techniques—with the U. S. Treasury helping support teachers who are accepted for such institutes to the amount of $75 a week. This medium of upgrading teachers has been inspired by the experience of the National Science Foundation, which has successfully used training institutes to upgrade science and math teachers. And so the new act spreads and deepens the federal government's participation in in-service education.

Finally, take the measure of the new act's possible influence on higher education by surmising what it will do to stimulate college enrolments through the use of student loans and through the use of graduate fellowships.

We have by no means exhausted the act's possible influence. While it gives the U. S. Commissioner of Education unprecedented scope for action, it also gives state departments of education an opportunity to assert new leadership. The act directs that the identification of able students (through guidance and testing) shall be carried on in accordance with a state plan—which means state officials can hardly afford to gloss over that crucial national problem. And, again, the act directs that the strengthening of

(*Continued on page* 53)

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61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
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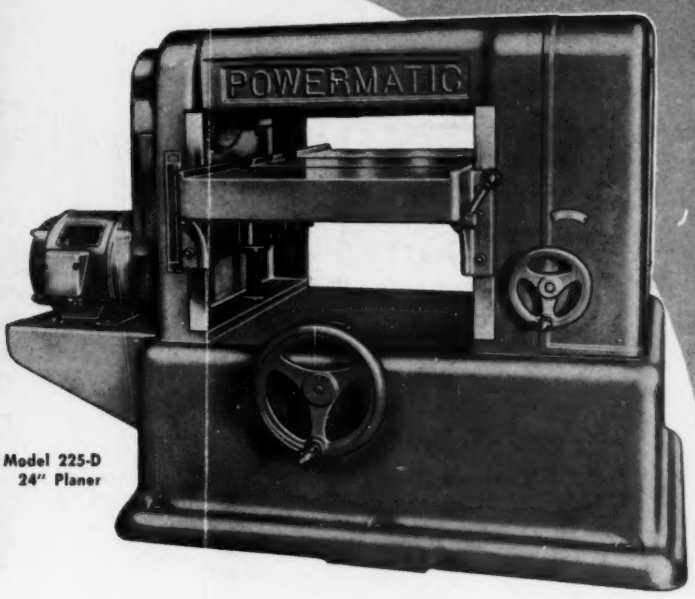

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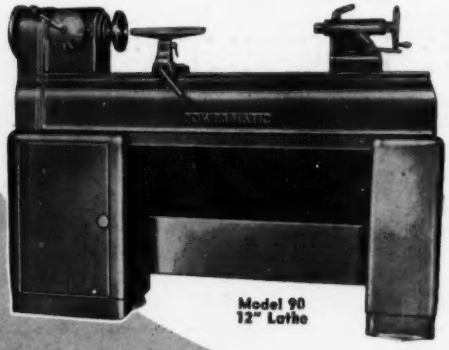

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